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PAPER

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Nutrition education for the public

Discussion papers of the FAO Expert Consultation

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Contents

Tables

Figures

Preface

This publication contains the full texts of the six technical discussion papers prepared for the Expert Consultation on Nutrition Education for the Public held from 18-22 September 1995 in Rome, Italy. The report of this consultation was published as FAO Food and Nutrition Paper 59 in 1995 and contains concise summaries of the discussion papers. With the publication of the full text of the papers, FAO aims to further promote the important field of nutrition education for the public in order to reinforce healthy dietary practices, prevent malnutrition and contribute to the improvement of nutrition of all groups of populations. This publication is to complement other recent FAO publications in this field such as "Get the best from your food", Social communication in nutrition, Report of joint FAO/WHO Expert Consultation on development and use of food based dietary guidelines held from 2-7 March 1995 in Nicosia, Cyprus.

Past experiences and needs for nutrition education: Summary and conclusions of nine case studies

Barbara Smith[1]

INTRODUCTION

The nutrition education case studies from nine countries discussed in this paper were commissioned by FAO in order to provide an indication of trends in nutrition education, as the basis for discussion during the Expert Consultation on Nutrition Education for the Public, 18 - 22 September 1995. The case studies are representative of a number of different regions and approaches. Most are recent and have not been reported before. In summarising these studies, this author has adopted a standardised format to highlight key aspects of the studies and provide some basis for comparison, where this may be appropriate. The format adopted is to highlight the nutrition issues being addressed and the general context for the intervention in a *background* section, followed by *objectives, target groups, sectors* and/or *settings* involved, *strategies* used, *duration* of the project, any results from *evaluation,* and finally the *conclusions* of the case study authors themselves. Where case studies have not reported on all these aspects of their programme, this is indicated. No case study authors identified the funding resources available other than to indicate in some instances whether support was received from the United Nations or other agencies. It was therefore not possible to discuss the possible effect of resource constraints. Each country case study summary is followed by brief *comments* by this author. The discussion below provides this author's conclusions regarding the trends which emerge overall, how these compare with past reviews and what examples of best practice are provided by these studies to better inform similar projects in the future.

The case studies demonstrate the diverse socio-economic and cultural conditions from which nutrition problems arise, and in which public nutrition education interventions have to operate. While poverty underpins many of the problems being addressed, it is also clear, as in the case of Oman, that rapid social change, even when it increases the resources available to a household, brings changes to the food supply and to lifestyles, that can produce serious nutritional consequences for a population. Most public nutrition education is aimed at enabling populations to make better use of available resources, or to know how to adapt to environmental changes. The case histories describe a wide range of information, education, and communication

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(IEC) strategies to achieve these aims, and many programmes include strategies designed to provide structural and environmental supports for nutritional improvement.

BACKGROUND

The nature of nutrition education

Nutrition education has been defined by Andrien (1994) as "that group of communication activities aimed at achieving a voluntary change in nutrition related behaviour to improve the nutritional status of the population". A distinction is often made between the terms *"nutrition education, nutrition communication, nutrition promotion* and *information, education and communication (IEC)"* (Graeff, Elder & Booth, 1994). There is a great deal of overlap in actual practice. Education activities can include *information* processes which are generally designed to inform unilaterally, e.g. through print and broadcast (radio and TV) channels or the more traditional *communication* processes which use interpersonal, face-to-face channels, e.g. group discussions, home visits, training and counselling. Each channel has its own strengths and weaknesses and it would seem that strategies which combine multiple channels have the most impact on changing behaviour. The question is no longer which channel is best but rather, how to use a combination of channels to teach and support nutrition behaviours.

While the focus of education activities is on changing individual behaviour, there has been a growing recognition that the health of individuals and their health-related behaviour is the product of that individual's continuous interaction with his or her environment. This includes the family, community, culture, social structure, and physical environment.

The Ottawa Charter for Health Promotion (WHO, 1986) developed by 38 countries has had a major impact on the ways of promoting the health (including the diet related health) of individuals, groups and populations. The Charter identifies five interdependent domains for action:

- Build healthy public policy.
- Create supportive environments.
- Strengthen community action.
- Develop personal skills *(education).*
- Reorient health services *(to promote health as well as treating illness).*

In this way, educational strategies to bring about behaviour change in individuals are given structural and environmental support. "Make healthy choices, easy choices". This has lead to definitions of health (nutrition) promotion which still have education as a central activity. For example, "Any combination of health (nutrition) education and related organisational, economic and environmental supports for the behaviour of individuals to promote (nutritional) health" (Green & Anderson, 1986). The parentheses are added to show the applicability to nutrition.

This broader concept of health promotion asks planners to consider building both education and supporting strategies into programmes. Frequently this will require inter-sectoral collaboration, e.g. developing a vitamin A communication strategy in the health sector and

working inter-sectorally with agriculture to promote the home production of foods rich in vitamin A.

Trends in nutrition education

Nutrition education has been heavily influenced in recent years by theories and models of health behaviour change derived primarily from three disciplinary streams: psychology and other behavioural sciences, communication models, and social marketing (Achterberg, 1993). This has lead to a series of widely used public health communication models that include "how to do it" steps (Achterberg, 1993). These include the Triple A model of assess, analyse, and action. Green's Precede model emphasises the importance of identifying the *predisposing* factors (knowledge, beliefs, values, attitudes, confidence) that provide the rationale or motivation for the behaviour; the *enabling* factors (skills and resources) and the *reinforcing* factors (family, peers, teachers, etc.) which reward or contribute to the persistence of behaviour. The five-step model includes assessment, planning, development, implementation, and evaluation. More recently, Andrien has developed a planning model based on four phases: Conceptualisation, Formulation, Implementation, and Evaluation (Andrien, 1994).

In general these influences have lead to a more scientific and rigorous approach to planning, in which the importance of analysing the determinants of the nutrition problem, and clearly defining objectives and methods of communication are recognised. The principle of community participation in programme planning and evaluation, as well as implementation is also gaining acceptance.

Evaluation should underpin all nutrition education programmes. The importance of planning at the outset for evaluation and monitoring is recognised, as is the value of continuous evaluation, as the basis for reorienting actions during the course of a project.

There is a growing interest in adopting a settings approach to nutrition education. Selecting key settings (perhaps not traditionally seen as the domain of nutrition education programmes), enables population sub-groups to be reached where they work and live. The use of a wide range of settings and organisations provides for positive links to occur across disciplines and can encourage a wider community involvement in nutrition issues. A settings approach can also emphasise changes in organisations which support individual change ("healthy hospitals", "healthy worksites", "healthy schools", "healthy communities", etc.). Settings for reaching the whole population can include, apart from primary health-care services, schools, day-care centres, worksites, recreation settings, social, religious, cultural or sporting groups, retail and commercial settings – street vendors, and cafeterias.

Current issues for nutrition education

A number of reviews of nutrition education programmes in developing countries have been undertaken in recent years. These have been valuable both to highlight difficulties which can occur and also to provide examples of good practice which can be shared.

Issues for behavioural change

There are now a number of evaluations which provide credible evidence for the positive effects of education on health and nutrition behaviour. The factors which these evaluations have identified as contributing to successful behaviour change are summarised in Table 1. It should be noted that much of the scientifically developed knowledge base for nutrition education rests largely on evaluations of programmes conducted in developed countries. Strategies selected to bring about behaviour change should be mediated by local knowledge and contexts.

Actually bringing about behaviour change depends on many factors – probably the most critical being having behaviour change as the clear aim of a programme. The availability of trained personnel who understand and can implement behaviour change strategies appropriately, and who can involve learners in solving their own nutrition problems is essential.

Table 1: Factors determining successful behaviour change

- Active Involvement. Active involvement of learners in identifying their own needs. (2,5,6)
- Appropriateness and convenience of settings. The ease and convenience of taking action. (1)
- Stages of behaviour change. Behaviour change must be seen as a process, e.g. raising awareness of motivation does not automatically result in behaviour change. (1,7)
- Setting Realistic Goals. Promotion of small discrete changes is more likely to be effective. (1,5)
- Specificity. Providing people with specific information about the desirable behaviour and how to make changes. (1,2,5)
- Variety. Specific interventions are more effective than general exhortations. A range of specific interventions is likely to be effective (1)
- Multiplicity. More than one channel of influence should be used to provide consistent messages from several sources. (1,3,4,8)
- Use of social networks. Community organisation and community leaders can support change. (1,5)
- Choice. Information which allows for reasoned choice is preferable to didactic methods. Opportunities must be given to discuss the issues. (1,3,5,6)
- *Intrinsic Value*. People are more likely to persist with actions if they find them enjoyable or rewarding. Present the desired behaviour in an enjoyable manner. (1)

- *Sound Information and Instruction.* Accurate information and instruction on how to make changes and channels for social action are critical. (1,3,5)

- *Discussion.* Decision and problem solving methods are more effective than didactic methods. (5)

- *Independence.* Dependence on any particular place or person reduces the individual's capacity to act independently. Developing problem solving skills is important for independent action. (1)

(1) Lee and Own (1985)
(2) Parlato, Green and Fishman (1992)
(3) Cerqueira and Olsen (1990)
(4) Achterberg (1991)
(5) Whitehead (1973)
(6) Gussow and Contento (1984)
(7) Zeitlin and Formacion (1981)
(8) Hornik (1985)

Issues for nutrition education programmes

There is less evidence available about the feasibility of reproducing positive results routinely and on a large scale. Given the limited resources available to most countries, nutrition education must have the capacity to have an impact on large sections of the population in a cost-effective way. The following issues have been identified as important for affordability, effectiveness, and reach, particularly for large-scale programmes.

- *Programme design*

Programmes need a clear institutional framework and government commitment (Berg, 1987, Achterberg, 1991, Cerqueira & Olsen, 1995). Programmes need to plan for building commitment at all levels. Planning for monitoring and evaluation at the outset is also crucial. Experience suggests that evaluation design should be as simple as possible for large scale programmes.

Clear and achievable goals, objectives, and strategies should be established based on an analysis of the factors affecting dietary practices and consultation with target groups. Limiting the number of components makes the goals more achievable. Training and capacity building should be planned for.

- *Targeting*

Appropriate targeting can substantially reduce costs (Berg, 1987).

- *Duration*

If demonstrated improvements in the nutritional status of large population groups are being aimed for, new programmes may need to run for at least six years (Berg, 1987). New

programmes must have sufficient lead in time to allow for detailed planning, consultation and field testing of education resources (Parlato, Green & Fishman, 1992).

- *Community participation*

Successful programmes work with the community and community leaders to promote solutions to nutrition problems (Parlato, Green & Fishman, 1992; Cerqueira, 1990; Whitehead, 1993; Gussow & Contento, 1984).

- *Strategies*

There has been a move away from medical models of educating, to the use of a range of strategies and communication channels, and the use of approaches such as social marketing (Achterberg, 1991.) There is a trend towards the increased use of locally available mass media, the adoption of more participatory approaches, and the inclusion of learners in all aspects of programmes (Gussow & Contento, 1984; Israel & Nestor-Tighe, 1984; Hornik, 1985; Zeitlin & Formacion, 1981; Cerqueira, 1990; Cerqueira & Olsen, 1995; Achterberg, 1995). There is a growing recognition of the need to include strategies designed to create supportive environments for behaviour change, and to sustain the effects of programmes through strategies designed to strengthen local ownership and to develop structural and institutional support.

SUMMARY OF CASE STUDIES

General characteristics of case studies

The case studies provide a valuable insight into a range of approaches. Four case histories examine specific public education strategies, operating mainly through print and broadcast channels. The Pacific paper evaluates the development of print resources for the region. The Polish paper evaluates the use of food labels as an educational tool, and from the Caribbean, there is an evaluation of a mass media campaign to address the issue of food safety. From Oman a study is described which used print and broadcast channels to promote improved infant and maternal nutrition.

Case studies from Niger and the Federal Republic of Germany include education activities which employ interpersonal channels as well as print and broadcast channels. The Federal Republic of Germany reports on a comprehensive information, education and advice strategy involving training of trainers programmes for a wide range of health and non-health professionals, combined with the establishment of mobile nutrition services and of local nutrition centres aimed at creating an accessible and reliable nutrition IEC environment. Niger addresses vitamin A deficiency using 'animation' teams who use games and role play to facilitate discussion and interaction with villagers. This interactive technique was linked with the development of broadcast and print resources.

The third group of case studies used IEC strategies in combination with environmental supports. The LAKASS programme from the Philippines combined a range of IEC strategies within a social mobilisation and advocacy framework linked to income-generating and food-

production projects. From the rural Andes comes a case history using schools as the entry point to increase the knowledge and skills of the children and the local community, particularly in the area of vegetable growing and small animal production. This strategy was integrated with a broader community development project. Finally the Indian, Tamil Nadu Integrated Nutrition Project combines nutrition delivery services, rural health services and social mobilisation with a communications component in order to improve the nutrition of young children. Table 2 summarises the general characteristics of the Country Case Studies, grouped to show the relative complexity of the programmes, as defined by the range of strategies employed.

Table 2: General characteristics of Country Case Studies

Issues (I), Target groups (TG), Strategies (S)

Group 1: One way communication
- Print and broadcasts channels

Group 2: Two way communication
- Interpersonal channels.
- Print and broadcast channels.

Group 3: IEC and Environment Supports

Individual Knowledge Attitude Behaviour

1. **Pacific**
   - I. Malnutrition and NCD.
   - TG. Community workers.
   - S. Print resources.

2. **Poland**
   - I. Low level nutrition knowledge.
   - TG. Consumers.
   - S. Food label information.

3. **Caribbean**
   - I. Food borne illness.
   - TG. Food vendors.
     Public - children, householders.
   - S. Radio, TV
   - (Linked to Regulation and Surveillance strategies)

4. **Oman**
   - I. Decline in breastfeeding.
     Poor infant and maternal nutrition.
   - TG. Women (15-44 years).
   - S. Print and Broadcast media.

5. **Niger**
   - I. Vitamin A Deficiency.
   - TG. Village families.
   - S. Print, Broadcast media.
     Village 'animation' groups.

6. **Federal States of Germany**
   - I. Need to increase accessibility and reliability of nutrition information, education and advice.
   - TG. Whole population, particularly children.
   - S. Mobile nutrition units.
     training of key community people.
     Local nutrition Centres.

7. **India (Tamil Nadu)**
   - I. Malnutrition children <3 years.
   - TG. Mothers, mothers-in-law, fathers.
     Secondary TGs.
   - S. IEC.
     Nutrition delivery services.
     Health Services.
     Social mobilisation.

8. **Philippines (LAKASS)**
   - I. Malnutrition, poverty.
   - TG. Families with children <6,
     Women 15-45.
   - S. IEC.
     Credit assistance/income generation projects.

9. **Ecuador**
   - I. Malnutrition, food and water born illness.
   - TG. Children, families and communities - rural villages.
   - S. School programme.
     Food production/diversification.
     Community development.

Case study 1: Evaluation of a nutrition education programme in Oman[2]

Background

Oman is the second largest Gulf Cooperation Council (GCC) country with an area of 300,000 km^2. The country is situated in the south-eastern corner of the Arabian Peninsula, sharing borders with Saudi Arabia, the United Arab Emirates, and Yemen. Most of Oman is semi-arid plains, desert, and mountains. The population of Oman is two million (1993) with nearly half a million people being Indian immigrants.

Both undernutrition and overnutrition exist in Oman. Undernutrition of children is a problem, with 13%-30% of children aged one to six years being underweight. The prevalence of stunting ranges from 9%-29%. Iron deficiency is a major problem with 60% of pre-school children suffering from anaemia, which increases to 78% among children aged 6-14 years of age and decreases to 55% among adults.

Several factors contribute to undernutrition among children, including the decline of breast-feeding, early introduction of weaning foods, unsound food habits, infectious diseases, and unhygienic preparation of foods for children. Rapid socio-economic changes during the 1980s has resulted in the emergence of obesity and other diseases of affluence. In 1980, 17.4% of female adults were obese. By 1991, the prevalence had increased to 54%.

Objectives

To encourage:

- Mothers to breast-feed their children as long as possible.
- Sound weaning habits by introducing the right foods at the right time.
- Sound food habits during pregnancy and lactation.
- Hygienic preparation of foods for infants and young children.

Target groups

- Primary: Women, mothers of reproductive age 15-45 years.
- Secondary: Health workers.

Sectors and settings

The Ministry of Health: work was carried out with an inter-sectoral committee, 'The National Women and Child Plan', supported by UNICEF.

Educational materials were distributed to clinics, hospitals, and health centres. Television and radio spots on commercial stations were used to reach women in their homes.

[2] A.O. Musaiger.

Strategies

- Posters: weaning habits, healthy eating in pregnancy, promoting breast-feeding.
- Booklets: Health workers – proper management of breast-feeding, weaning and healthy eating in pregnancy and lactation.
- Leaflets: given to mothers.
- Television: several spots were prepared.
- Radio: information through family and health programmes.

Duration

The programme commenced in 1989. It has been continuous in health centres and periodic on radio and television.

Evaluation

A representative sample was selected (1024 mothers). They were interviewed by women students. Evaluated in 1991.

Conclusions

Most potential for nutrition education seems to lie with television, as there are high television ownership and low literacy rates. However, nutrition messages compete with food advertising, and the widespread use of satellite television with many channels makes positioning messages difficult. Mothers favour late evening as the best time for viewing television, and mornings for radio. However, most messages had been targeted to afternoon television. The effectiveness of printed materials was limited by high rates of illiteracy (50% men, 80% women). Eighty eight percent of women had seen the posters (80% in hospitals), but it was evident that the messages of two of the three posters were not clear to mothers.

Comments

The major lessons learnt from this case history are the need to involve target groups in the planning of the project, the need to pre-test printed materials, and for market research to segment the audience and decide on the appropriate placement of television and radio messages. It also raises the question of whether television, in spite of its popularity and high ownership rates, can be an effective stand-alone educational medium where there are so many commercial channels available, carrying competing advertising messages. The number of channels also made message placement difficult. These difficulties, and the high rates of illiteracy among Omani women, perhaps suggest that greater attention should have been given to face-to-face strategies in hospitals, particularly as 80% of women reported seeing the posters in a hospital situation. It is not clear whether health workers conducted classes for mothers or were given training. It seems that they just received the educational materials. The evaluation focused on programme and message delivery. It would have been valuable to have measured changes in knowledge and behaviour.

Although the Ministry of Health worked with an inter-sectoral committee, the settings used were exclusively health, apart from the mass media messages directed to households. The case history author concludes that there is a need for training both in methods of communication and in the management of nutrition education programmes.

Case Study 2: Public education campaign in the English-speaking Caribbean on food safety and control[3]

Background

Although the countries of the region have a relatively small land surface, they are separated by vast expanses of water. The majority of English-speaking people who were targeted in this project are poorly literate. In 1983 FAO, the Pan American Health Organisation (PAHO) and the Caribbean Community (CARICOM) convened in Antigua to develop a Strategy and Plan of Action for Food Safety and Control in the Caribbean. This comprehensive strategy dealt largely with surveillance and control services and included an education and community participation strategy.

A preliminary study indicated that food-borne illness, especially diarrhoeal diseases, often initiates and aggravates malnutrition. The research also indicated the need to educate the population on the importance of proper handwashing; the protection of infected wounds/boils; the holding temperature of food (particularly with fast food and street vending); the dangers of the inadequate cooking of foods and the importance of maintaining a hygienic environment where food is prepared, sold, and consumed.

Objective

The reduction and prevention of the incidence of food-borne illness, through the adoption of safe food habits in the home and community.

Target group

Restaurateurs, street vendors, cooks in child care institutions, school children aged 12-15 years, housewives.

Sectors and settings

Co-ordinated by the Caribbean Food and Nutrition Institute (CFNI) in collaboration with the Council of Voluntary Social Services Organisation (CVSS), an umbrella body consisting of 60 member organisations, which included large numbers of people of various disciplines, social status and political persuasions. The third partner was the Department of Sociology, UWI, Jamaica. UNESCO provided seed money. Subsequently the project worked closely with the Caribbean Institute of Mass Communications (CARIMAC).

[3] C. Forrester

Strategies

A mass media campaign using radio and television was the central strategy. Radio was assessed as accessible to a large cross section of audiences with lower production costs than television. Television was accessible to fewer people and very expensive.

A media consultant employed by the project facilitated a three-day workshop for 23 experienced media practitioners, 32 mass communication students, and CFNI members as resource persons. The workshop went through a process which led to the adoption of three television and 15 radio spots, and a catchy jingle which became the theme of the campaign - 'covered, clean and cold'. The mass media students were from CARIMAC, UWI. The students, who were in their final year, were linked to media houses in the region. Their involvement secured their commitment to subsequent mass media activities on the subject and was a factor in media houses extending the campaign messages free of cost as a public service.

Messages were designed specifically for the three major target groups – adolescent school children, householders, and food handlers. The messages were pre-tested and minor modifications made. The audio and video tapes were acquired by the organisations within CVSS and used in public forums and in produce markets.

Duration

One year, 1986.

Monitoring and evaluation

All radio and television stations were monitored monthly to determine the frequency of broadcasting. The messages were found to be frequently broadcast in most cases. Resources limited the evaluation to a sample of 332 restaurateurs, food vendors, housewives, household helpers, and students. In the selection of samples from St Christopher/Nevis and St Lucia, effort was made to have respondents covering demographic categories of age, occupation, sex, residence, and place of work. The sample group was tested before and after the campaign. In the case of St Christopher/Nevis, only students were sampled on the post-test which did not allow for much comparison within the population. A control group, which had not been exposed to the messages, was created to be compared with the experimental group. The evaluation established that there was a statistically significant increase in knowledge (17.6% increase in Guyana; 48.4% increase in St Lucia, and a 69.7% increase among students in St Christopher/Nevis). The theme and the jingle were easily remembered and very popular. External variables were not controlled. The author comments that the influence of other variables in the post-test scores could have been anticipated by including appropriate questions in the post-test questionnaire, and that individual interviews and focus groups could have been used to help validate the evaluation findings.

Conclusions

The author concluded that the project had strengthened the capacity of CFNI to make more aggressive use of mass communication channels. Previously they had relied almost

exclusively on the print media. Partly due to the improved media relations facilitated by this campaign and the network of media practitioners developed, CFNI has worked with the media on a number of subsequent public education initiatives.

The inter-sectoral collaboration with CVSS and others established in the project, has strengthened CFNI's outreach capabilities at the community level. The significant feedback from the campaign in the form of requests for information, emphasises the need for continuity and follow-up.

Comments

This case history provides an example of the benefits of collaboration with both the media and social organisations. This was the first major mass media campaign in the Caribbean, and the process of audience segmentation and pre-testing of messages undoubtedly contributed to its success. It also served as a training process for the CFNI in the use of mass media.

Case study 3: Nutrition information and food labels as an aid in nutrition education of society in Poland[4]

Background

The level of nutrition knowledge in Poland is low. Nutrition education activities are not co-ordinated and much overlap and fragmentation occurs. Nutrition education in schools is limited by a lack of qualified teachers, an insufficient focus on health and the lack of a discrete curriculum component. Mass media (magazines) are frequently the source of false information about nutrition. Food advertising has had a negative influence.

Comprehensive surveys of consumers have indicated poor knowledge in the area of nutrients supplying energy: the energy value of food products and the food sources of key nutrients. There is better knowledge of the benefits of fibre and the harmful effects of an excess of fat and cholesterol in the diet, although not of the role of unsaturated fatty acids and salt. There are differences in knowledge levels according to age, sex, and level of education. Women, the well educated, and middle aged people have a higher knowledge level than men, the poorly educated or the very young or very old. Surveys also show a very low ability to read, interpret and recalculate data on food labels. Young people and the well educated have a better understanding.

The Department of Human Nutrition at the Warsaw Agricultural University conducted a series of four studies from 1990 to 1994 to examine various aspects of using food labels to disseminate nutrition information. Nutrition labelling has become especially important in Poland and other post-communist countries, because of the introduction of a free market economy in which the consumer faces the complexity of choosing from a wide range of highly modified and

[4] W. Roszkowski and A. Kollajitis-Dolowy.

processed foods. These studies also have policy implications as there is a need to harmonise Polish food regulations with the EC Food Laws.

Objectives

- To evaluate the interest of consumers in nutrition information of food labels (1990-1993, study 1).
- To evaluate different forms of nutrition information with regard to readability, presentation range, and perception of content (1990-1992, study 2).
- To determine the effectiveness of different forms of information (leaflet, talk, video) distributed to teach consumers how to read, understand, and use data contained on food labels (1993-1994, study 3).
- To develop an education strategy for schools to educate students on how to use food label information (in progress).

Target groups

Consumers, school children.

Sectors and settings

A research project conducted by the Department of Human Nutrition of Warsaw Agricultural University.

Strategies (methodology) and results

In *study 1 (consumer interest)* a representative sample of the adult population was surveyed by questionnaire. More than 80% of respondents reported paying attention to nutrition information while shopping. However, 45% only paid attention occasionally, 25% frequently, and only 13% almost always. Women, the better educated, professionals, older people, and urban dwellers were more interested than men, the poorer educated, blue collar workers, the very young, and rural dwellers.

Only 7% of respondents placed nutrition information as the first factor influencing purchase decisions. Freshness, appearance, price, and attractive packaging were more likely to influence buying.

Study 2 (forms of nutrition information) was conducted on a group of 470 consumers at randomly chosen grocery shops in two big towns and one village. The form of presentation of nutrient information which gained the highest approval (40%) was numerical form, with a full range of content, particularly when the nutrients were indicated with bold type face or when there was a nutrition claim. The study stressed that one third of the least educated people were not able to choose any form of nutrition information as the appropriate one.

Study 3 (the effectiveness of education materials to support food labelling) was conducted through a questionnaire given to 1977 randomly sampled secondary school students (general, technical, and vocational schools). The survey compared differences in the level of knowledge by testing before and after applying one of three methods of communication (leaflet, talk, video film). Subjects were tested straight after use and then after three months. The results depended on the nature of the questions.

The most effective method was achieved by video film regarding the facts least known before the studies. Both video and talk methods were the most effective in dealing with questions requiring data from the nutrition information to be calculated. The leaflet method was more effective than video, only in the case of theoretical aspects dealing with the role and function of nutrients in the body.

Conclusions

Nutrition labelling can be one of the strategies used for educating the public. Although consumers declare an interest in nutrition information on food labels, interest is still relatively low which limits its educational effect. Young people show relatively less interest in nutrition information on food labels compared with the middle-aged.

Nutrition information in numerical and numerical-graphic form is preferred by consumers, but to meet various needs, the video film method of explaining the nutrition information on food labels is overall the most effective.

The author also recommends that nutrition education in schools in Poland should be updated to make it more effective, that better co-ordination of nutrition education efforts is needed, and that more use should be made of the mass media.

Comments

The findings of studies 1 and 2 tend to confirm prior studies which show that consumers are generally interested in nutrition information on food labels, but find it difficult to use and make sense of (Gussow & Contento, 1984). Study 3 demonstrates that consumers can be fairly easily educated to better understand food-labelling information through one-off sessions. The question remains about the relative merits of food-labelling information in an overall nutrition education strategy. Labels are found on packaged food and nutrition labelling may suggest to naive consumers that packaged food is nutritionally superior to unlabelled, fresh foods, particularly if the food is fortified. Nutrition labelling also gives information on the food per se rather than its role in a healthy diet.

Case Study 4: The Pacific[5]

Background

The Pacific region is spread over 30 million square kilometres and contains 22 island countries and territories including some 7,500 islands. Of these only about 500 are populated.

The different races of people and the areas they settled in the Pacific are generally divided into three groups: Micronesian, Melanesian, and Polynesian.

Micronesia: The people settled in the Marianas, Marshall Islands, Federated States of Micronesia, Palau, Guam, Nauru, and Kiribati.

Melanesia: This covers the islands of Papua New Guinea, Solomon Islands, Vanuatu, New Caledonia, and reaches as far as Fiji.

Polynesia. The islands stretch from Hawaii to New Zealand, and from Tuvalu to the Easter Islands.

In mid-1994 the region's total population was 6.7 million. In terms of size the region is dominated by the five Melanesian countries, which account for 98% of the land area and 84% of the population. However, smaller island states carry the higher population densities. Compared with ten people/km^2 in Melanesia, Polynesia has a density of 70 people/km^2 and some Micronesian islands reach 146 people/km^2.

Food and nutrition problems in the Pacific are substantial, with high levels of malnutrition in young children in Melanesia and Micronesia. This is linked to increased risks of respiratory tract infections and to increased severity of diarrhoea. In some islands vitamin A deficiency is prevalent in children aged one to five years. Iron deficiency anaemia is another common nutrition problem. High rates of infant mortality pertain in many of the Micronesian countries. Changing lifestyles (less physical activity) and a shift away from traditional local nutritious foods to imported foods are contributing to serious problems of heart disease, diabetes, cancer, and other non-communicable diseases.

A major strategy in combating these problems is community nutrition education with support training. The South Pacific Commission (SPC), founded in 1947 and based in Noumea, serves the 22 countries of the region with technical assistance including an integrated programme covering diverse activities in health, nutrition, agriculture, women's programmes, statistics and demography, oral health, AIDS, etc. The University of the South Pacific (USP) in Fiji is a regional institution serving 11 Pacific Island countries with both award courses as well as in-service training courses and workshops.

[5] T. Matenga-Smith.

Objectives

- To provide the region with a database on the composition of regional foods. (Food Composition Tables, SPC).

- To promote local foods through the development of information leaflets. (Food Leaflet Series, SPC).

- To provide regionally and culturally appropriate materials for use in training and community education programmes (Training Materials, USP).

Target groups

Community and health workers, teachers, agriculture workers.

Sectors and settings

The SPC in collaboration with the USP.

Strategies

Development of nutrition education resources for the region:

- Pacific Islands Food Composition Tables: Analytical work commenced in 1952. It involved co-operation with analytical programmes in New Zealand and Australia. By 1953, 65 foods were analysed. No further work was done until 1987, when a full-time co-ordinator was appointed. Priorities for analyses were established by user questionnaires in the region. With the assistance of New Zealand from 1989, the Food Tables have been completed. They contain over 800 foods analysed for 21 nutrients. A computerised database has been established. A further 200 local foods still need analysis.

- Food leaflets: Arising from the food composition work, each leaflet pictures the food, highlights its nutritional value, comparing it with other local foods, and gives storage, preservation, and preparation information. These are widely used in community programmes. Over 40,000 of these leaflets have been used in the 22 countries. Some countries have translated them into the vernacular.

- Training materials: Regional meetings have frequently emphasised the need for culturally appropriate nutrition training for health and community workers. A series of 13 nutrition education books have been developed. The process of development included over 70 Pacific Islanders (mostly women) from 19 countries. The materials focus on the promotion of local foods, basic nutrition knowledge, and preventing and treating diet-related problems. They were extensively field tested and involved co-operation among many sectors and countries.

- Training programme: USP and SPC have completed 14 training modules for a Community Nutrition Certificate which commenced in 1994 with 100 students from 12 countries.

Duration

Ongoing.

Evaluation

Not reported.

Conclusions

The participatory approach used has helped mobilise the community. It has lead to a strong sense of "ownership" of the resources and programmes. Pacific Island Governments need to build on these initiatives by taking a more "proactive" role in nutrition education, particularly in relation to school programmes.

The success of the project can only be measured in small ways, as lifestyle changes continue and no significant reduction in NCDs has occurred. These initiatives are seen as capacity building and support for the development of further health promotion activities.

Comments

This case history is primarily a description of capacity building for nutrition education in the Pacific region through the development of education and training resources and a community nutrition training programme. The development process for resources is characterised by the high degree of participation by both community representatives and community workers of the region to ensure cultural appropriateness and local ownership. This collaboration has resulted in countries of the region having resources available to them which individually they would not have been able to produce.

Field-testing and reviewing is referred to in the case history but not reported on. It would have been valuable to have the actual uses of the resources, and their usability by nutrition educators in each country, documented. There seems to be little institutional support for this process from country governments, with the resources not being linked to education and training programmes.

Case Study 5: Federal Republic of Germany. Nutrition education, information and advice in the new States since 1990[6]

Background

The former German Democratic Republic (GDR) had a complex and cumbersome infrastructure for nutrition research and nutrition education. The stagnation of life expectancy and the prevalence of the diseases of malnutrition were attributed to the social and economic environment and lifestyle factors. People tended to resist the information made available, (partly because of food shortages) and held to traditional consumption patterns that were not always consistent with good nutrition. The challenge for the new system was to find a way to develop nutrition education intervention measures which would become part of the social structures influencing nutrition behaviour and which would reach large numbers of people. There was a need to provide information about the new products now available and to combat media misinformation.

Objective

To provide the population with information on new food products and the general principles of eating for good health, in a way which was accessible, credible and relevant to people's lives.

Target groups

- Key change agents - health professionals, teachers, community leaders.
- General public, in particular pre-school and school children, parents, women.

Sectors and settings

Ministry of Food, Agriculture and Forestry, Central Office of Health Information, in collaboration with state governments, the German Nutrition Foundation and Consumer Advice Centres. Delivery of information was to local communities, schools, and a range of community-based clubs, agencies, and organisations.

Strategies

A comprehensive range of strategies was implemented to make reliable nutrition information readily accessible to the population, particularly at the local level.

- Training: A training strategy underpinned the programme and enabled trained people to initiate nutrition education projects. Training was provided for teachers, doctors, librarians, and pharmacists through a mobile unit. Caterers were trained in nutrition through the Institutional Feeding Advice Service supported by the German Nutrition

[6] I. Leonhauser and I. Ruck.

Foundation. Food law and food hygiene training were provided to such people as veterinarians and food chemists.

- Mobile Units: Six buses were furnished with technical equipment (personal computer, video and monitor, projectors) and materials (brochures, information sheets). They were staffed by a multi-disciplinary team of four. The Units provided: (i) direct advice to the public, (ii) developed nutrition education in co-operation with schools, health and consumer advice centres (iii) provided training courses. The mass media was used to promote the work of the Units.

- Consumer Advice Centres: These centres initiated a wide range of nutrition education activities and promotion, e.g. they established local nutrition centres, supported the Mobile Units, worked with the media.

- Nutrition Foundation: The Foundation also initiated many public nutrition education activities, e.g. healthy school breakfasts and snacks, iodine campaign, developed programmes with schools and nursery schools, ran letter and telephone services.

Duration

Continuously since 1990.

Evaluation

Evaluation is now being gradually undertaken. The Mobile Unit was widely used and accepted. Training programmes were well attended and there is a steady demand for advice and information from Advice Centres.

Conclusions

There is a need for further co-ordination of activities and for evaluation and assessment of cost effectiveness. This strategy of working within local communities and in a client-centred way, seems to be working, but there is a need to understand more about the psychological and social aspects of target groups. National standards for training are needed.

Comments

This case history reports on a wide range of strategies directed at increasing nutrition knowledge for most of the population. Evaluation is referred to, but not reported on, other than to report on high attendance rates in training programmes and an increase in consumer demand for nutrition information. The author comments on the need for "an exact definition of the target group", and it would seem highly desirable to research the specific needs of population sub-groups in order to focus the strategies to where they are most needed and may have the greatest impact. Evaluation of existing activities should be a high priority.

There also appears to be a need for greater co-ordination of nutrition education at all levels of government.

Case Study 6: Republic of Niger. Public nutrition and nutrition education experience and requirements[7]

Background

Many surveys have identified major nutrition problems in the population. Protein-energy-malnutrition, vitamin A and iron deficiency are widespread, with pregnant and nursing mothers and children under five being the most vulnerable groups. The government has been focusing on increasing food production and the development of a new health service infrastructure, including community-based mother and child care services.

The prevalence of vitamin A deficiency in the Sahel region is partly due to the lack of availability of foods rich in vitamin A, particularly in the lean season, but partly due to lack of knowledge. This paper reports on a social communication and nutrition education project directed at reducing vitamin A deficiency and a communications training project.

Objectives

- To develop a methodological approach to communication in nutrition to reduce vitamin A deficiency, through the increased consumption of locally grown food rich in vitamin A (community project).
- To provide support in training and methodology of audio-visual communication tools and their use (training project).

Target groups

- Rural villagers (community project).
- Health and agricultural extension workers (training project).

Sectors and settings

Health, with support from USAID (vitamin A project), health, agriculture, media - support from FAO. The community project was delivered to rural villages. The training programme was directed to health and agriculture workers.

Strategies

- Community project: The project was a pilot targeted at three villages without a health clinic or gardens. Initial research looked at local knowledge, attitudes, and practices; identified affordable, available vitamin A rich foods and surveyed the media. Night

[7] A. Mamadoultaibou.

blindness was well known but not related to food. Wild green leaves were readily available and acceptable. Reception on local radio was very poor. Television was not available.
Five people per district trained in communication techniques using a 'Learning through fun' approach. They were called the 'village animation teams' and presented games and role play to village audiences in a way which involved participation. The project was evaluated and found to be very effective. Subsequently the project expanded to 80 villages.

- Training and capacity building: The 'Communication Support for Sahelian Programmes against Malnutrition and Vitamin A Deficiency' was given institutional support at every level - national, regional, district, and village, with inter-sectoral involvement at each level. This structure allowed for the initiation, co-ordination, and monitoring of communication strategies. The pilot lasted 21 months.
Training workshops were held on the use of rural radio, audio visual aids, and video, which lead to a multi-sectoral team developing radio messages and scripts, posters and a number of video programmes.

Duration

The pilot project lasted 21 months with subsequent expansion (it may be still ongoing).

Evaluation

The pilot was evaluated and considered effective. (No details of the evaluation are reported).

Conclusions

The capacity for nutrition communication has been strengthened. The projects enabled successful inter-sectoral and multi-sectoral approaches to be developed. The clear institutional framework has fostered good working relationships. However, lack of equipment and funds for communication (e.g. document copying and delivery) led to communication problems within the project.

Traditionally, nutrition education methods have been didactic and based on a superficial analysis of the causes of malnutrition, and delivered by health workers poorly trained in communication. It is now recognised that strategy planning within a multi-sectoral, multi-media context is more effective. A range of communications methods are now used and the importance of community participation in all aspects of communication activities is recognised.

Comments

The training component of this project has given health care providers a theoretical base for their nutrition education work and expanded their skills in situational analysis and communication methods. It has shifted the emphasis from didactic talks to mothers, towards using participatory methods and a range of communication channels. The project linked health workers and made them part of a multi-sectoral strategy, thus reducing the 'isolation' many of them experienced. The case history demonstrates the need for, and value of training health workers in the area of nutrition education.

There is reference to training of workers from other sectors including agriculture and education. It would have been valuable to know how many workers from which sectors have been trained and to follow up on the ways they have been able to use their training.

Case Study 7: India. The Tamil Nadu Nutrition Project. A case study of the communication component[8]

Many strategies are employed in India to alleviate poverty and malnutrition. Although the primary determinant of undernutrition is an inadequate dietary intake, lack of knowledge is a contributory factor. Nutrition education therefore has the potential to improve nutritional well-being. The Tamil Nadu Integrated Nutrition Programme (TINP) is a large-scale programme, implemented in the South Indian State of Tamil Nadu since the 1980s. TINP is funded by the World Bank and integrates health and nutrition interventions with a major communication component. TINP - 1, which is discussed in this paper, operated in six less developed districts, covering an estimated 1.1 million children and 0.28 million expectant and nursing mothers.

Objectives

- To reduce malnutrition and the consequent high mortality in children under three years of age.

- To improve the health and nutritional status of children under three years and that of expectant and nursing mothers.

Target groups

Children under three years. Pregnant and nursing mothers.

Sectors and strategies

Health, with the support of the World Bank. The programme was delivered in health centres and households in rural villages.

[8] K. Vijayaraghavan.

Strategies

- Nutrition delivery services: Weighing of all children of six to 36 months at Community Nutrition Centres. Malnourished children were enrolled for short feeding programmes. Pregnant women were also selectively fed.

- Health services: Ante- and post-natal care, focusing on a reduction of infant and child morbidity and mortality.

- Communication: Designed to: (i) make mothers fully aware of the nutritional needs of children, (ii) address better intra-family distribution of food, (iii) enable the community to handle its health and nutrition needs more effectively.
  Targeting, both for nutrition intervention and communication, was critical. The communication strategy segmented the audience into primary and secondary targets and strategies were carefully planned for both. Two-way communication was used for the primary target group and one-way communication for the secondary audience. The primary target group was mothers, mothers-in-law, and fathers. Counselling was used, linked to weighing and supported by flip charts and flash cards.
  The secondary target group was the rest of the population. The methods used were films - incorporating popular film tunes, film strips, and slides. Pamphlets were available for the literate.
  An innovative strategy was the use of popular folk media "villupattu". Professional troupes incorporated nutrition messages into "villupattu" and audio cassettes were produced.

- Social mobilisation: Women's Working Groups (WWGs) were formed. They were trained in communication. Each group "adopted" a number of families, assisted with counselling mothers and later ran income generation projects, e.g. 200 WWGs produced weaning foods.
  Children's Working Groups (CWGs) relayed messages via songs, poems and jingles.

- Training: There was a three-month training for primary health care workers (PHWs), plus a two-week refresher after two years. Community Nutrition Workers (CNWs) - local mothers, were locally trained for three months. Joint training was conducted for the last ten days for PHWs and CNWs to build rapport and understanding. Annual refresher courses were provided. CNWs were supervised and supported.
  There was strong bureaucratic and political commitment to the project. The communication component was separately managed by a co-ordinator who was assisted by a team including a communication research officer, a librarian and an artist. Management was planned at all levels.

Duration

The project began in 1980 and ended in 1987.

Evaluation

Comprehensive but manageable evaluation was integral to the programme. Independent evaluations were conducted of the experimental and control type. Base-line, mid-term, and terminal surveys were conducted. No separate evaluation of the communication strategy was conducted, but it would seem that its main value probably lay in achieving better utilisation of project services.

The programme achieved a 55% decline in malnutrition over 72 months. In areas where the programme was evaluated over four years, the reduction was about 35%. Overall a 40% decline was achieved, with spectacular decreases in clinical deficiency signs. No statistical analyses were applied.

Conclusions

A major contribution of the communication strategy was to increase the community's use of services. IEC activities should be supported by other services/strategies which make it possible to act on the messages. Target groups were not involved in planning, and it is difficult to assess whether involvement would have improved the programme. It would have been valuable to have had direct monitoring of the communication component and to have had key indicators developed in this area.

A major factor in the success of the programme was the strong bureaucratic and political support. The project was carefully planned, but had flexibility and made modifications as needed. Technical expertise was available from national and international experts. The CNWs were local and credible to the community. Training and community participation through WWGs were other critical factors in success.

Comments

As the evaluation was not systematic and supported by statistical analyses, all conclusions should be interpreted carefully. Furthermore, no specific evaluation of the communication component was undertaken, making it impossible to assess its role in achieving nutritional improvements, which could have been mainly due to the feeding component of the programme. Formative evaluation was conducted to determine the most appropriate methods for the target groups, and audience segmentation methods were used. There was no pre-testing of messages or materials, although some modifications occurred during the programme as the result of feedback.

This case history again highlights the importance of training, which was given a high priority, although there is no report of an evaluation of this training. Overall this project is generally regarded as cost effective but the high cost of developing and distributing films, slides, posters, audio cassettes, and posters could be prohibitive for projects without outside funding. A range of communication channels was used, including folk media. In general TINP-1 suggests that interpersonal communication, supported by media, is appropriate for illiterate communities.

Case Study 8: Ecuador. School vegetable gardens in the rural Andes. A school nutrition education experiment as part of a global community project[9]

Background

Evaluations of past attempts to improve nutritional status in Ecuador, particularly of women and children, indicated limited success. A combined Ecuadorian and French study concluded that the health sector or the agriculture sector alone could not resolve these problems. They also concluded that what was needed was a multi-disciplinary team working on the different causes of malnutrition, whether they were insufficient food supplies, economic difficulties, socio-educational and behavioural maladjustment, or health problems. This study led to the development of ANDES - an analysis-action-training programme. The programme is multi-disciplinary and multi-sectoral. It employs a community development approach which calls on people to participate in a meaningful way and in accordance with their social norms. The ANDES programme includes strategies for food production, food security, health services, improved sanitation and water, and education and training in the formal and informal sectors. The project described in this paper is a component of the ANDES programme.

The programme recognised three fundamental values: (i) the close relationship between the people and the land, with the earth viewed as a mother figure; (ii) that the community is central and prevails over the individual; and (iii) the relationship with God. Rites and festivities are bound to the triptych of God-community-earth.

Objectives

Local communities decided on the following priorities:

- To improve the productivity of maize, the staple food.
- To diversify household food consumption by promoting fruit and vegetable growing and small animal husbandry.
- To provide safe water from stand pipes placed at locally designated spots, and by installing showers, wash basins, and toilets in schools.

Target groups

It was decided that all community members of all ages were to be included. This case history focuses on the strategies directed at children.

[9] M. Chaulinc

Sectors and settings

A multi-disciplinary team, French and Ecuadorian, of doctors, agriculturists, educators, and sociologists. The setting for this project was five village schools in the rural Andes and the local communities.

Strategies

School based education: It had been decided that school children were to be involved in the development activities. The decision to use schools as an entry point was not easy, as the rural communities saw schools as urban-oriented and out of touch with village life. The divide between school and community was even greater in the region of San Jose de Minas where this programme was conducted. Villagers used any excuse not to send their children to school. School and community integration was therefore a major focus of the project.

- Food and nutrition component: Children were introduced to the concept of nutrition and the role of agriculture in the human diet. They were asked to think about their own consumption, food availability and dietary patterns, and they examined popular perceptions of local foods.
  Locally produced aids were developed, such as blocks of wood (like dominoes) with foods drawn on them, to use for educational games. A school shop was set up with children bringing food to school to play "shop" – to learn nutritional value for money, etc. Cooking lessons were organised, based on the foods and conditions at home, but adhering to hygiene standards and principles of nutritious food combination. Mothers prepared iron-enriched bread for consumption at school.

- School vegetable garden: Food growing skills were developed in three stages relating to the three cycles of education over the six years of primary school. This component developed children's knowledge of vegetable growing suited to the local culture and conditions. Active learning was fostered. Teachers were trained and a school garden established.

- Guinea pig breeding: Guinea pigs are a local food source. They are usually kept in unhygienic conditions. A permanent facility was built at the school to teach children the proper care of these animals to increase productivity and to provide a model for the community.

Duration

Since 1991.

Evaluation

Children's knowledge, attitudes, and gardening skills were evaluated using experimental and control classes. Tests were validated and results statistically analysed.

Other indicators were direct observation of children's food consumption and such factors as children asking for seeds to take home.

There were significant knowledge gains for all children. The children's skill levels increased markedly between the beginning and end of the school year. The results for increased self-esteem, self-confidence and application were extremely positive.

Conclusions

The formative years of childhood are particularly important for nutrition education. Given that a child mainly depends on the family for food, schools must cooperate with families in guiding food habits, rather than confronting them. Nutrition education in schools must build developmentally and include skills as well as "theory". There is a great potential for integrating a school food and nutrition programme within a broader community programme and involving children in community development processes. In this project, the local community participated in all stages and the children became change agents for their families.

Training of health, agriculture and education professionals should sensitise them to all the determinants of food habits and facilitate their ability to work in a multi-disciplinary team.

Comments

This case history provided details of an extensive and rigorous evaluation of the school programme, which included measures of change in children's knowledge, attitude, skills, and food consumption. The resources available to the project from the French and Ecuadorian multi-disciplinary team no doubt made such extensive evaluation possible. The overall principle of community participation was also applied to this component of the project, with parents and teachers involved in developing the school programme and parents participating in school activities. An important aspect of this project, which no doubt contributed to bridging the traditional gap between the school and community, was the inclusion of learning activities (food production, etc.) of direct relevance to the community, and the development of resources adapted to local conditions.

Case Study 9: Philippines. The LAKASS Programme in the Philippines[10]

Background

LAKASS is an intensive nutrition action programme formulated and co-ordinated by the National Nutrition Council (NNC) of the Philippines. LAKASS is an acronym standing for a Philippine statement meaning, *"The body will become robust and healthy with adequate nutrition"*.

[10] T. Stuart

LAKASS addresses the twin problems of poverty and malnutrition. It combines livelihood opportunities with direct and indirect nutrition services, and includes a component on social mobilisation and IEC. The programme draws on the co-ordinated strength of the community in addressing its own nutrition problems.

The programme was initially implemented in 1989-1991 in 136 of the most nutritionally depressed municipalities (NDMs) of the country. In 1992-94 it was expanded to a further 31 NDMs, covering a total 167 NDMs out of 1,316 depressed municipalities and cities nation-wide. The community was involved in identifying the specific problems affecting the adequacy of food intake and the nutritional status of individuals and families. These included child-feeding practices, family food supply and demand, health and sanitation, intra-family food distribution and the economic condition of the household.

Objectives

- To improve the nutrition situation in the identified NDMs and Barangays (villages).
- To provide effective and sustainable services for, and by the community to improve their nutritional status.

Target groups

The family, particularly children under six years of age and women of reproductive age (15-45).

Sectors and settings

LAKASS was a national initiative, funded and supported by NNC and implemented by Local Government Units. Universities were commissioned to conduct monitoring and evaluation.

The expansion programme utilised the existing structures of the Philippines Plan of Action for Nutrition (PPAN), which consisted of regional nutrition committees and provincial, city, municipal or Barangay nutrition committees.

The programme was delivered in nutritionally depressed villages and municipalities.

Strategies

- Social mobilisation: Community participation in all aspects of the project.
- IEC support materials: At the national level, locally researched and designed materials were mass produced. These consisted of LAKASS brochures, LAKASS implementing guidelines, nutritional guidelines, training kits, programme management information, leaflets, and posters.

A major way of reaching mothers was through Mothers' Classes. These weekly classes provided for active participation in discussion, and demonstrations on issues relevant to child health and nutrition. These classes also provided an opportunity to discuss traditional practices.

- Advocacy: Regular meetings were held with the 31 mayors of the NDMs, initially to seek counterpart funds and commitment to institutionalise LAKASS in local development plans. Subsequently, meetings provided a venue for experience and problem sharing.

- Training: Training was provided for municipal and Barangay officials, teachers, beneficiaries, government and NGO representatives. Local trainees learnt to assess their own nutritional problems and respond appropriately. This led to projects involving schools, livelihood projects, and home and school gardens.

Duration

1989 – 1994.

Evaluation

Monitoring and evaluation were built into programme design. Three programme stages were externally evaluated by universities: pre-implementation, mid-year implementation and a year-after implementation to assess impact. (Details not reported).

Conclusions

LAKASS has a commitment from Local Government through the institutionalisation of the programme into local government development activities with a budgetary allocation. Community training and participation developed strong local support. Credit assistance for income-generation projects have successfully augmented family income and ensure a steady food supply for low income families. All these aspects of the programme will contribute to its sustainability.

The LAKASS programme has proved to be effective in improving the economic and nutritional status of children, mothers, and other household members. For example, there was a 16% decrease in the prevalence of wasting among pre-school children and a reduction of stunting among pre-school children by 21%.

Although social mobilisation and IEC are regarded as integral components, they have not been given adequate staffing, resources or specific attention in research, planning, implementation, monitoring, documentation, and evaluation.

Recommendations include the need to strengthen these components by designating a specific group at the NNC, with counterparts from State colleges and universities, to systematically plan, implement, and evaluate social mobilisation and IEC. Further training in these areas also needs to be developed, particularly directed at potential multipliers of the

programme. Advocacy campaigns around the role of social mobilisation and IEC should continue.

Comments

This case history provides a model for sustainability through successfully institutionalising the programme into local government development plans with a budgetary allocation. It is another example of a project which integrates a number of strategies designed to support and enable communities to act on nutrition education. It would have been valuable in this, as in other integrated programmes, to have had an evaluation of the impact of the education component, as it is difficult to assess the role played by these activities in relation to the other strategies.

DISCUSSION AND CONCLUSIONS

A feature of these case histories is the expansion of the **scope of nutrition education**. It is generally agreed that interpersonal methods conducted in local communities are appropriate to address the common problems of maternal and infant malnutrition, and this has been, and no doubt will continue to be, a major focus for nutrition education programmes. However, these case histories demonstrate an increasing concern to provide environmental and structural supports for these efforts, as in the LAKASS and Tamil Nadu programmes. There is also evidence of using multi-channel approaches more often in these situations and a trend towards more participatory methods. However, there is also evidence in these case histories of the need to address a range of nutrition issues arising from rapid social and technological change which is occurring in many countries. The Polish, German, Oman, and Caribbean case histories are examples of these, addressing variously the availability of more packaged and processed foods, changing food habits and the changing information environment in Poland, Germany, and Oman, and addressing food safety issues in the Caribbean. There is a definite trend towards more **inter-sectoral collaboration**, as in the case of collaboration with the media and social organisations in the Caribbean, with education in Ecuador, and local government in the Philippines. The **settings** for nutrition education in these case histories include schools (Ecuador, Germany), point-of-sale retail (Poland), local clubs and organisations (Germany), although the local community and health services continues to be the most common settings.

The **evaluation** of programmes varies considerably, with the Ecuador project providing for a rigorous process and outcome evaluation, while in others evaluation has yet to be addressed, as with the German programme. In some instances of integrated programmes, the education component is under-resourced and under-evaluated, making it difficult to determine its effects in relation to other components. The effectiveness of some programmes was seriously affected by lack of formative evaluation and pre-testing of materials, as in the case of the Oman programme.

Training issues also are variably addressed, although in almost all case histories, some training is provided for. It would have been very valuable to have had an evaluation of the training aspects included in the case histories. A need for training in the use of the mass media was frequently identified.

As mentioned, a major trend to emerge from the country case histories is that of using a combination of strategies and communication channels. **Interpersonal methods** emerge as an appropriate and effective way for reaching low literacy groups (especially where there is no broadcast media), for addressing complex skills and issues, or for discussing issues which may be regarded as sensitive for the target groups. Interpersonal channels were used in the Niger project where there was low literacy and poor reception of local radio. They were the basis of the Ecuador project, which taught school children skills over time and engaged the community in problem solving. In the LAKASS project, informal discussion allowed mothers to discuss the extent to which new knowledge could be integrated with traditional beliefs. In Poland, video and talk methods were the most effective in explaining how to apply nutrition information from labels. Given the difficulties of positioning messages over the many available television channels and the high illiteracy rates of women in Oman, it may have been valuable to strengthen the interpersonal methods used in this programme.

A feature of most projects is the increasing importance given to developing strategies only after extensive analysis of the influences on behaviour. This leads to a better understanding of what is likely to be effective. An interesting dimension of the interpersonal communication reported is how innovative many methods were, for example, the use of games and role play through village animation groups in Niger; the use of folk media in the Tamil Nadu project; the use of mobile units in Germany; and innovative local nutrition games in Ecuador.

The growing use of the **mass media** is also a trend, particularly as television becomes more accessible to greater numbers of people and as educators gain skills in its use. The Caribbean case study is particularly useful to identify a capacity-building process in the use of mass media. Through collaboration with media practitioners, a most successful mass media campaign was developed and nutrition educators gained skills and confidence. An interesting feature of this process was the additional use of 32 final-year media students, who were already attached to media agencies for training purposes. These students helped produce the messages of the campaign and developed a commitment to the project. Subsequently, as employees of media agencies they supported public service extension of the campaign, free of cost.

In Niger, the capacity to use a range of media was strengthened by training in the use of rural radio, the development and use of audio visual aids, and the use of video: Several studies highlight the critical importance of adequate 'market research' for mass media use, particularly in relation to audience segmentation, careful selection of channels which reflect the patterns of use of the target audience, the importance of pre-testing messages, and the importance of monitoring.

The Polish studies on the use of **food labels** as a source of nutrition information is pertinent for any country where there is a high or increasing use of packaged and processed food. The complexity of successfully using such a strategy can begin to be understood if we consider which of the 50 or so nutrients should be included, and in what forms, on which of many hundreds, or in some countries, many thousands of foods. How does this help

consumers understand the relative nutritional merits of different packaged foods or the role of packaged foods in relation to unpackaged and unlabelled foods? It is becoming increasingly clear from the Polish and other studies that food label information has to be supported by education in *how* to use the label information.

Both the Pacific and the German case studies highlight the importance of **using methods appropriate to the social and cultural context**. The Pacific paper reports on the co-operative development of culturally relevant education and training materials for a vast region in which such development would be beyond the resources of individual countries. The Federal Republic of Germany addressed the urgent need to increase the credibility, the reliability, and the accessibility of IEC services at the local level. The strategies included extensive training of key community figures as change agents and positioning mobile units and advice centres locally.

Another major trend is the use of **social mobilisation** and **community participation** methods. The Philippines LAKASS project involved the community in a five-step process covering all aspects of the programme from planning to evaluation. The Ecuador project used a community development approach in which the community identified its own problems and prioritised their needs. The Tamil Nadu project used women's and children's groups to mobilise the community. The use of children as change agents is an interesting feature of both the Tamil Nadu and the Ecuador projects. Generally, it would seem that programmes using strategies which foster community ownership and control of projects are much more likely to be sustainable. Nonetheless, depressed communities must be extensively supported if their capacity to deal with malnutrition is to be strengthened. It would also have been valuable to have more detail on who in the community participates, and in what ways.

The need for strong institutional and **political commitment** has previously been well documented and is again highlighted in these papers.

RECOMMENDATIONS

(i) Recognise the central importance of nutrition education as a strategy for nutritional improvement when malnutrition arises from an inadequate use of available food resources and where there are rapid changes occurring in the food supply and lifestyle habits.

(ii) Make specific budget allocations for nutrition education in countries where malnutrition is a major barrier to the achievement of development goals and include nutrition education as a specific component of development plans.

(iii) Encourage all large-scale projects to allow sufficient lead-in time to achieve the best possible design. Programme design should include:

- Clear, achievable goals and measurable objectives, based on an appropriate situational analysis.

- Appropriate primary, secondary, and tertiary target groups.
- A plan for facilitating the participation of target groups in all aspects of the programme.
- Selection of settings most likely to reach the target groups and which can support behaviour change.
- Selection of methods and strategies both educational and supportive, which are likely to achieve the objectives.
- A clear evaluation plan which includes both formative (including pre-testing of materials) and summative elements.
- Plans for training (educators, managers).
- A programme implementation plan.
- A clear institutional framework and clearly defined roles and responsibilities.
- An indication of the ways in which sustainability is being planned for.
- A communication strategy for the programme itself.
- A realistic estimate of inputs – time, materials, people.

(iv) Make the development of mass media communication skills a priority.

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A framework for nutrition education programmes

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INTRODUCTION

The framework for planning and implementing nutrition education programmes presented in this paper is based on a number of assumptions arising from past experiences of nutrition education and on the changing context for nutrition education in many countries. It should be clear that this framework is intended to promote discussion about the appropriate concerns, parameters, approaches, and processes of nutrition education programmes, not to provide a prescriptive model.

Part one, based on work undertaken by the Victorian Health Promotion Foundation, Australia (Galbally, 1992), describes four components fundamental to planning nutrition education programmes. These four interactive components are underpinned by the nature of the food supply. The framework attempts to broaden the traditional focus of nutrition education in two ways. First, by addressing social health and epidemiological indicators for population sub-groups, the framework should lead to the development of health enhancement programmes, as well as disease prevention interventions and ensure that the principles of equity become intrinsic to the process.

Second, analysing the environmental and social factors that contribute to the low health status of population sub-groups should lead to more appropriate settings and methods in programme planning. While it is true that nutrition promotion and education programmes cannot contribute directly to changing structural factors, such as poverty, income level, employment, and educational status, or the social impacts of race, gender, age, disability or ethnicity, they must take these impacts into account in the design, development, and implementation of the programme. This requires programme planners to move away from individual behaviour change and information transmission as the only approach, and to consider in their planning

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environmental supports, organisational change, advocacy and policy development, and, particularly working collaboratively across sectors and with social networks.

Part two of this paper draws on the knowledge that ineffective nutrition education programmes are more likely to be the result of ineffective implementation processes, rather than a lack of technical knowledge about what works in nutrition education to bring about behaviour change. Several major reviews have also indicated that adequate support from leaders and planners is essential for effective nutrition education programmes. Part two, therefore, looks closely at the phases in the process of implementing programmes, and highlights the need to establish a broad base of support throughout.

PART ONE: A FRAMEWORK FOR PLANNING NUTRITION EDUCATION PROGRAMMES (Barbara Smith)

Background

The scope of nutrition education

A central assumption of this framework is the question of whether nutrition education should be mainly concerned with those population sub-groups at risk or already suffering from malnutrition, or whether planners can and should be working more actively to prevent malnutrition and promote the knowledge, skills, and supports which will enhance and sustain good nutritional health.

It also raises the question of whether nutrition education must only be concerned with communication activities. For example, one school of thought says that the nature of the food supply is not a proper concern for nutrition education and this has led to definitions of nutrition education such as "any system of communication that teaches people to make better use of available food resources". The difficulty with such a definition is that it does not tell the nutrition educator what to do if available food resources are inadequate, confusing or have an insecure future.

Gussow and Eide (1985) propose that the role for a nutrition educator should be "one who helps people of whatever social, economic or political circumstances to meet their need for nutritious food". This definition implies strategies which go beyond communication activities and encourages planners to consider whenever possible a variety of strategies to address the factors which are determinants of eating patterns.

This framework therefore aims to broaden the role of nutrition education programmes to include those which not only address existing problems, but also those aimed at promoting and enhancing nutritional health. It also proposes a role for nutrition education which incorporates a range of programme strategies, as well as communication and education activities.

The reason for proposing a broader approach arises primarily from the changing context for nutrition education in many parts of the developing world. For example, Theme Paper No. 5 from the International Conference on Nutrition (ICN) (FAO, 1992) discusses the radical and rapid social transformations which are occurring as the result of mass urbanisation. It is predicted

that by the year 2000, about 45% of the populations of developing countries will be living in urban areas, up from 17% in 1950. In absolute terms this means an increase from about 285 million to over 2,250 million people. A significant proportion of urban dwellers are poor and their numbers are growing as urban economies are unable to provide employment for the large numbers of migrants.

The food choices of the growing numbers of urban poor are limited by economic constraints. They often live in poor housing and unhealthy environments, and they may be exposed to occupational hazards and become more sedentary. Urban poverty is associated with increases in infant and child undernutrition, poor diet generally in some societies, and an increased risk of cardiovascular and chronic diseases. There is an almost universal increase in fat and sugar consumption, compared with rural communities where diets are based on such crops as cereals, tubers, vegetables, and fruits.

While nutrition education, no matter how broadly defined, cannot resolve these complex social and economic problems, it can have a role to play in providing support for migrating populations, or those newly arrived in urban settings who are often confronted with a largely unfamiliar, industrialised food supply and limited purchasing power. It has been said that urbanisation often turns knowledgeable food producers into naive food consumers. Programmes within this framework could be designed to promote the knowledge, skills, and supports needed to be adequately nourished, and to avoid as far as possible the social and economic costs of malnutrition and disease. Depending on the situational analysis, such programmes might include a wide range of education and other methodologies, for example, to increase urban dwellers' access to more affordable traditional foods (growers' markets in the city) and revalue these foods (media, community leaders); to help people understand what is good nutritional value for money in the market-place and to be critical of the vigorous advertising of the least nutritious foods; to provide nutrition education for school children; and to implement or advocate feeding programmes and nutrition education for parents in schools and day-care settings or to provide or advocate affordable, nutritious food at worksites. Strategies commonly used in rural community programmes, such as social mobilisation and community development, may also have value and relevance in urban environments to increase local community control over nutrition issues and provide social support for improved nutrition.

Links with health promotion

During the 1980s there was a growing recognition that the health of individuals was the product of the continuous interaction of the individual with his or her environment. The Ottawa Charter for Health Promotion, sponsored by WHO and developed by 38 countries in 1986 has had a major impact on promoting the health (including the diet-related health) of individuals, groups, and populations. The Charter identifies five interdependent domains for action:

- build healthy public policy
- create supportive environments
- strengthen community action
- develop personal skills
- reorient health services.

In this way educational strategies to increase the knowledge and skills of individuals are given structural and environmental support. "Make healthy choices, easy choices" (WHO, 1986). This has led to definitions of health promotion which still have education as a central activity, as for example, "Any combination of health (nutrition) education and related organisational, economic and environmental supports for the behaviour of individuals, groups or communities conducive to (nutritional) health" (Green & Anderson, 1986). This framework proposes an approach to promoting good nutrition for the public, which operationalises the Ottawa Charter and should enhance the reach and effectiveness of nutrition education programmes.

Affordability

Finally, a framework which proposes that nutrition education addresses health promotion and enhancement, as well as risk factor reduction may raise the question of resources. For example, where resources are limited, is it better to preferentially allocate resources to school programmes in an attempt to create a more nutritionally literate future generation, or should resources be allocated to interventions in local communities at immediate risk from vitamin A deficiency? This framework assumes that we must find a way to do both.

Working inter-sectorally and collaboratively is fundamental to increasing the available resources. For example, teachers are already trained educators who, with some support, represent a huge workforce with the potential to have an impact on the health and development goals of a country. Agriculture extension workers may well have production targets or increased exports as their main agenda. Inter-sectoral collaboration can increase their capacity to advise communities on household food production for good nutritional health, without compromising other policy goals. Collaborating with social organisations, for example women's organisations, to support maternal and child nutrition may be an affordable approach. The food industry has an interest in their products being viewed as health promoting and may provide resources for, or participate in, education initiatives. Strengthening the capacity of local communities to solve their own local food and nutrition problems is viable in many situations.

Fundamental to the Ottawa Charter and central to ICN recommendations is healthy public policy. The ICN urged governments to "develop comprehensive policies for improved food supplies and nutrition, adapted to local conditions in each country, and support and encourage home gardens, traditional food production and consumption patterns that support nutritional well-being" (ICN, 1992). Government policy can directly or indirectly support public nutrition education programmes. Misleading food advertising can be regulated, and some countries limit the amount of food advertising directed at children or for products such as breast milk substitutes.

Governments are also major employers. In this capacity they have a responsibility to implement government food and nutrition policies in their own worksites and facilities. Where government facilities provide food services, these should provide a model to the whole community for hygiene standards, the availability of nutritious foods, and nutrition information.

There is a considerable potential for the use of mass media in the nutrition education of the public, but purchasing media time and space can be prohibitively expensive. Where

governments are the owners of media, allocating free time for public education can provide valuable support for programmes. Similarly the granting of licences to private companies could require the allocation of a percentage of free public service time.

Government policy initiatives may be able to provide additional funding for health promotion and nutrition education. Some countries have imposed a tax on tobacco products, which is used exclusively for health promotion. A similar strategy could be the imposition of a tax consisting of a percentage of the total advertising budgets of food and beverage companies to be used exclusively in support of nutrition education initiatives. In Australia alone, food advertising expenditure is $A400 million per year. Some 80% of the advertisements are for foods which could be classified as nutritionally undesirable (soft drinks, confectionery, etc.) (Sindall, 1993).

Components of the framework

The food supply is placed at the centre of this framework (see Figure 1) because it must remain the focus of all nutrition education and promotion programmes. It is access to, and the availability of, food which largely determine the kinds of nutrition issues which arise for population sub-groups and these are major factors in the selection of target groups. The selection of settings, sectors, and methods will partly be determined by the extent to which these components have the capacity to influence and mediate people's relationship to food.

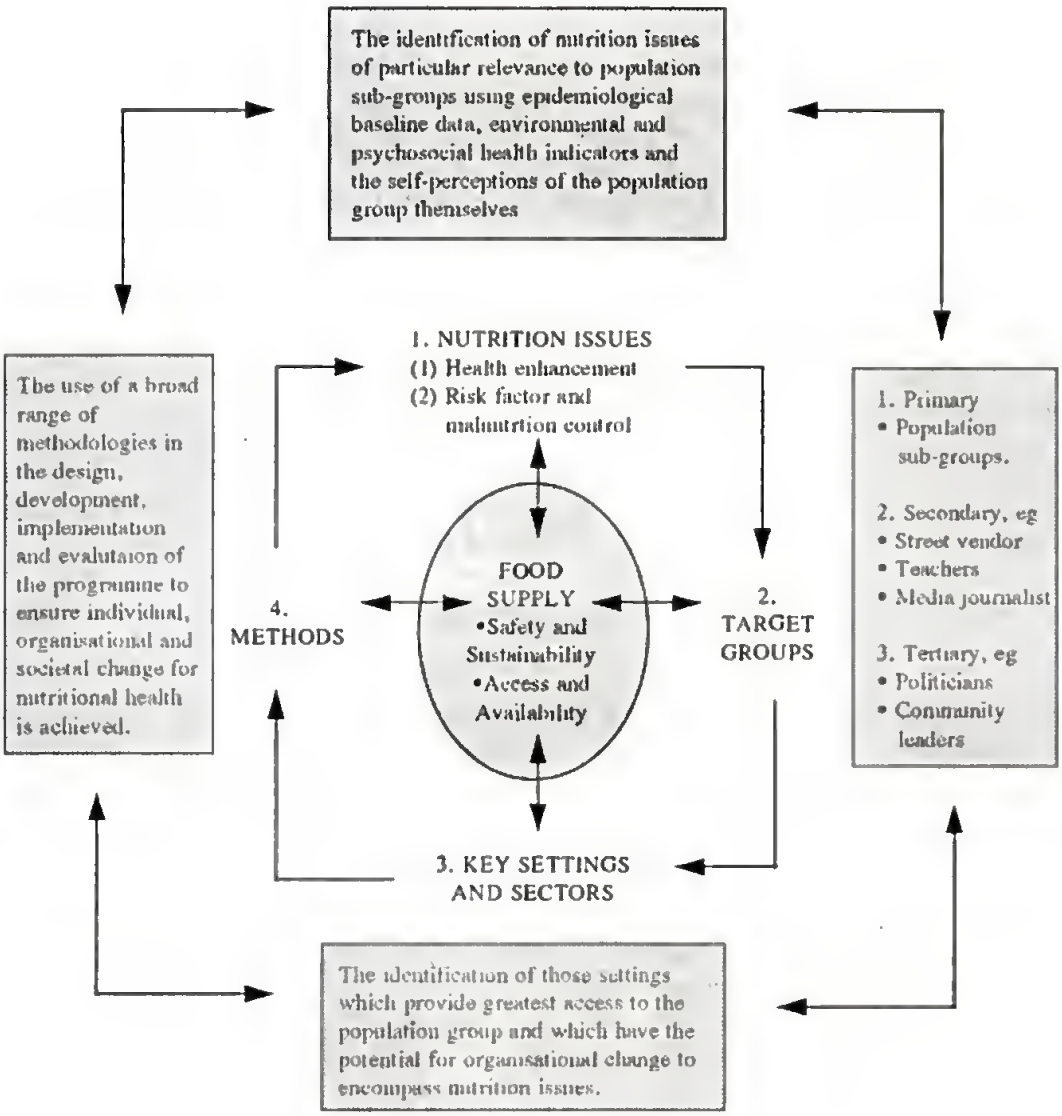
As stated above, the framework is based on four interactive components. The starting point is the identification of the nutrition issues for population sub-groups. This will lead to the selection of target groups and determine whether the programme falls into one of two broad categories: health enhancement or risk factor reduction. Selecting the target groups (or population sub-groups) leads to the identification of those settings and sectors which provide the greatest access to the group, and which have the potential for organisational change to encompass nutrition issues in the long term. Finally, the methods appropriate to the target group and the setting can be selected to achieve both individual and organisational change and to provide a supportive environment for change.

Programme planning is not always a logical and linear process. If planners choose to start with another component (e.g. a request from the agriculture sector to incorporate a nutrition education programme into their work), the four components of the programme planning should still be seen as working together and interdependent.

It is assumed that the framework is based on a continuous research and evaluation process. Research and evaluation methods are important aspects of the methods component, as is the need to decide the training and management methods for a programme.

Finally, the framework is generic in that it allows for the incorporation of a variety of different theories and approaches, or combinations of these in programmes. It aims above all to foster an integrative approach that avoids the dichotomies which have traditionally existed between, for example, community development and social marketing, or risk factor versus social determinants of health, or individual versus organisational change.

Figure 1: Framework for planning nutrition promotion and education programmes for the public. (Adapted from Galbally, 1992).



The food supply

The nature of the food supply and people's access to it are obviously fundamental to nutritional well-being. Cultural practices and traditions influence the actual choices that people make. Nutrition education programmes, therefore, need to take account of the availability of food, people's access to food and the factors determining choice. A traditional role of nutrition education has been to increase the capacity of the household to use existing food resources to maximum advantage, particularly in relation to breast-feeding, weaning, and supplementary feeding of children, dietary practices during infectious disease, nutrition during pregnancy and lactation and food hygiene. Education on the ways to produce food at the household level and on ways to store, process, and prepare these foods has also been incorporated into many programmes.

However, nutrition education also needs to accommodate social and technological change. The food supply of many developing countries is changing rapidly as a result of economic growth. Value-added, processed foods become available, bringing both benefits and negative consequences. Frequently, many of these foods provide poor nutritional value for money and may displace affordable and more nutritious foods. Traditional nutritional wisdom does not exist for the use of these products and people may depend on advertising to "know" about these foods. As these value-added foods are usually the most profitable, they are likely to be vigorously and persuasively promoted. Patterns of health and disease will change as food consumption changes.

Nutrition issues

The starting point in this model is the identification of the nutrition issues affecting population sub-groups. These should be based on data obtained by regular national monitoring and surveillance of the dietary intake and nutritional status of the population. Together with nationally developed Recommended Dietary Intakes for nutrients, these data can underpin the development of dietary goals or guidelines. Although the terms "goals" and "guidelines" are often used interchangeably, goals are more likely to be quantified, with expected times for achievement (targets). Dietary goals are usually changes in the national diet which will improve diet-related morbidity and mortality. They are designed for the use of health professionals and for monitoring policy. For nutrition education, goals are more likely to be described as guidelines and provide desirable directions for dietary change. Guidelines can be developed specifically for population sub-groups, such as children.

The issue of ecological sustainability of the food supply and the need for countries to maximise food self-sufficiency are rarely addressed in guidelines. However, it has been argued that these issues intersect with health and should be reflected in guidelines through the promotion of fresh, local, and seasonal foods. This will help reduce the vulnerability of food supplies due to imports, and reduce the energy costs of processing and transporting foods.

A second consideration in addressing the nutritional needs of population sub-groups is the development of environmental, social, and intrinsic indicators that contribute to nutritional status.

The environmental indicators include structural factors such as poverty and income level, employment status and educational status. While nutrition education cannot contribute directly to changing such structural factors, knowledge about these factors and, in particular, how they relate to the nutritional status of the population sub-group, will influence the settings and methods of a programme.

The social impacts of race, gender, age, and disability are significant factors which can create disadvantage in gaining access to adequate nourishment. Again, while nutrition education programmes can do little to mitigate against these impacts, they must take them into account in the design, development, and implementation of programmes.

Physical infrastructure, such as housing and transport, must also be considered in planning. All of these factors can in turn, relate to the factors that have an impact on the individual and his or her vulnerability to nutritional risk. Along with inter-generational and familial factors, they can influence nutritional status, self-esteem, and motivation.

Finally, the perception of a particular population sub-group of its own nutrition priorities will contribute significantly to the effective design of programmes. Programmes are much more likely to be effective if the issues of greatest significance to the group are addressed and they are involved in the planning, management, and ownership of the programme.

Assessing the nutrition issues of population sub-groups using both nutritional status and social health indicators, should lead not only to risk reduction programmes based on malnutrition reduction, but also to programmes designed to promote and enhance the health of the population.

Target groups

- Primary target groups:

(i) Population sub-groups - life cycle approach (see figure 2)

Assessing the nutritional issues of population sub-groups will lead to the identification of appropriate target populations. Taking a life cycle approach can be one way of ensuring that the needs of a whole population are assessed and of taking into account the developmental needs.

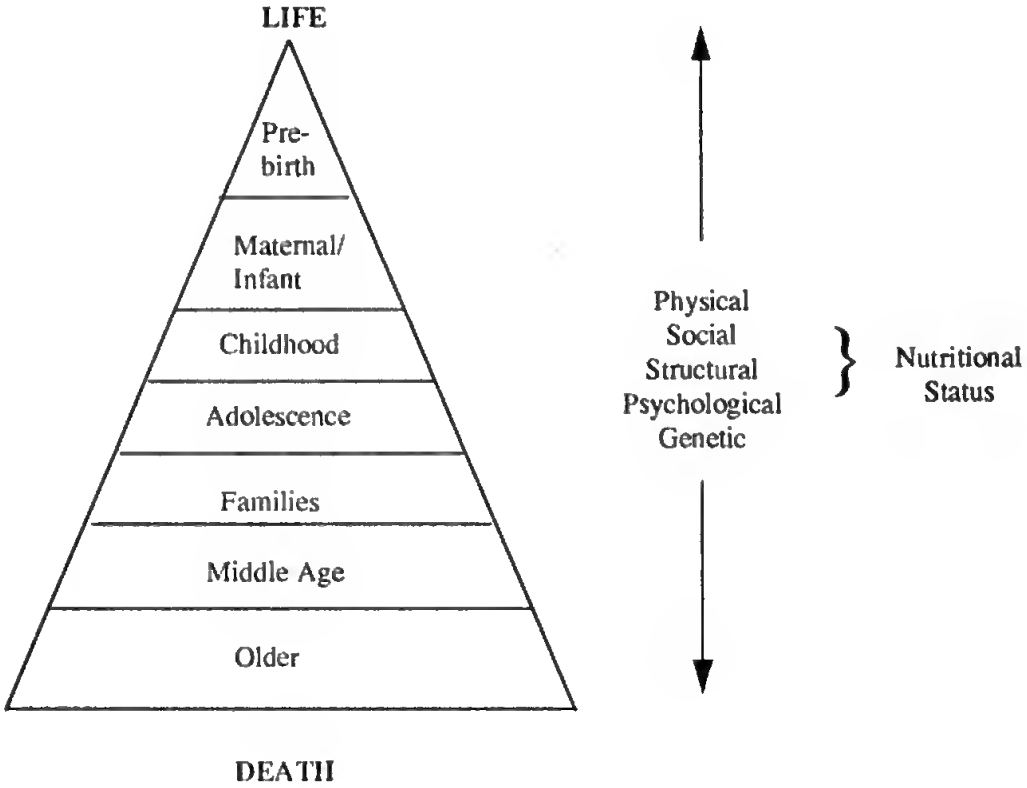
It has been suggested that the first stage would start at pre-birth and birth, the maternal and infant stage of life. The second stage could be seen as childhood, with adolescents having different developmental (and social) needs. The adult and family stages require different approaches again from the older stage of life.

(ii) Population sub-groups - special needs

In order to address inequalities in nutrition outcomes, groups with special needs should be identified and targeted. These groups will vary from country to country but could include ethnic communities, newly arrived migrants or newly arrived urban dwellers, unemployed and

low socio-economic groups, people with disabilities, disadvantaged men or women at particular risk for gender specific issues.

Figure 2: Life cycle population sub-groups
(Galbally, 1992)



- Secondary target groups:

Secondary target groups can be defined as the people who will be used to reach the primary target groups. These can include health workers, teachers, agriculturists, media journalists, food producers and retailers, child care workers, village volunteers, and so on. Training will usually be required for this group.

- Tertiary target groups:

These are people who are able to facilitate or support nutrition education initiatives. They may include decision makers at all levels - politicians and administrators, but can also include such people as influential community or religious leaders.

Settings and sectors

This model is intrinsically multi-sectoral because it relies on key settings which, apart from the primary health sector, are all external to health. The use of key settings, not traditionally seen as the domain of nutrition education programmes, enables population sub-groups to be reached where they work, live, and play. The use of a wide range of settings and organisations provides for positive links to occur across disciplines and encourages a much wider community involvement in nutrition issues. It also enables precise targeting of the population to occur and the development of methods suitable to the measurable and perceived needs of these locations.

Furthermore, a settings approach can emphasise changes in organisations which support individual changes (Galbally, 1992). Such an example is policy development at the organisational level that commits the organization to practices which support healthy eating, such as healthy food services or nutrition information services.

Settings for reaching the whole population can include primary health care services, general practitioners, community health services, families, villages and local communities, schools, day care services, work places, recreation settings - social organisations, arts, cultural and sporting groups, retail and commercial settings - street vendors, cafeterias, and food shops.

Working in a variety of settings and with a variety of organisations, requires collaboration and negotiation and the cultivation of long-term relationships across sectors (Glanz & Mullis, 1988). In each case, a strategic assessment of possible areas of mutual benefit and the strategic use of influence measures become the mechanisms for attempting to bring about change (Sindall, 1993). Despite the extensive rhetoric about inter-sectoral co-operation, little theory or documentation exists to guide nutrition practitioners.

Methods

- Education and communication methods:

Selection of educational methods should be based on what is appropriate for the target groups and the setting. An analysis of the determinants of the nutrition behaviour of the target group, including the factors likely to influence behaviour, is the usual starting point (Andrian, 1994). In the widely used Precede model this takes the form of identifying the predisposing factors (knowledge, beliefs, values, attitudes, confidence) that provide the rationale or motivation for the behaviour; the enabling factors (skills, resources) and the reinforcing factors (family, peers, teachers, etc.) which reward or contribute to the persistence of behaviour (Green, Kreuter, 1991). This is the kind of information that provides the basis for planning the education and communication methods to be used.

(i) Selection of channels

Face-to-face education, either in groups or on a one-to-one basis, has been the traditional approach to nutrition education. In recent years this approach has been seriously questioned, usually in the context of the relative merits of face-to-face versus mass media approaches.

Nutrition education presents some unique challenges in the health education area. While the origin of all human behaviours is complex, nutrition education has the additional problem that good nutrition involves the capacity to discriminate among many different foods. It may be easier to identify a single substance (e.g. tobacco) as injurious to health, or to promote the benefits of a capsule or injection, than to provide the information required to make choices about a range of foods. This is further complicated by the fact that no one food can singly be labelled "bad" or "unhealthy", as it is amount and frequency of consumption which will affect health. In addition, nutrition is an area in which information alone is unlikely to be helpful. Advice to add nutritious foods to rice gruel weaning food, requires not only information about what foods, in what amounts and with what frequency, but may also require the development of skills to grow and prepare these foods.

On this basis, it can be seen that face-to-face methods are likely to be the most effective for nutrition education. Evaluations of nutrition education confirm that programmes which have an impact on behaviour (not just on knowledge and attitude) depend on social context and interpersonal interaction to provide participants with the opportunity to practise the new behaviours and learn to solve their own nutrition problems over time.

Mass media strategies, on the other hand, are based on marketing and communication models which tend to deal with simple messages or a discrete food or behaviour. Nutrition education is rarely dealing with a single behaviour or single food. Nonetheless, mass media has been used effectively where this is the case, for example, encouraging the use of iodised salt. Using mass media has also been effective in raising community awareness of a nutrition problem, or most commonly as part of a multi-channel approach in which mass media supports other actions or face-to-face activities.

In general, it is agreed that face-to-face strategies are more likely to be effective in changing behaviour than mass media programmes. Using the strategies synergistically seems to be best option in most situations. Table 1 summarises the complementary nature of the two approaches.

Table 1: Some relative advantages and disadvantages of face-to-face and mass media approaches

	Advantages	Disadvantages
Face-to-face	• Interactive • Reliable • Provides social support • Allows for personalising • Allows for modelling	• Expensive • Penetration weak • May encourage dependency • May not be acceptable to many people

	• Appropriate sequencing easy • Follow-up easy	
Mass media	• Cheap per contact • Large numbers reached • More acceptable for many people • May stimulate self initiated change • Potential for further development through modern technology	• Weak engagement of users • Unreliable • Dilution of content • Follow-up difficult

Adapted from the Australian National Health and Medical Research Council's Nutrition Education Report (1989)

(ii) Food guidance systems

A significant issue is whether or not a country should develop a food guide as an educational tool for public education programmes. These usually take the form of a practical daily plan for food selection. Traditionally, recommending minimum daily servings which made up a daily "foundation" diet was the basis of food guides. The foundation diet was prescribed to provide approximately 70% - 100% of the Recommended Daily Intakes (RDI) for nutrients with additional foods (contributing insignificant amounts of nutrients) being discretionary. It has been argued that when there is a concern regarding the nutrient-energy balance of diets, the total diet should form the basis of food guidance. Another issue frequently raised is whether a country should have one guide or several. Those who argue for one guide maintain that a single guide gives consistency through public education programmes, in schools, the media, and advertising. A single guide can nonetheless be adapted for special needs, for example, low literacy, ethnic minorities or cultural differences. Others argue that a number of different guides needs to be developed for special nutritional needs, for example, different age groups.

Food guides can be developed in a variety of graphic forms (food wheel, pyramid, target, plate, standard blocks, etc.) to communicate the nutrition information. The effectiveness of the graphics and general communication strategy is evaluated less often than the nutrition aims.

Many other complex issues can arise in developing a food guide. These may include the extent to which a guide should reflect the current food supply and food practices, or whether it should represent an "ideal"; the extent to which guides should sacrifice accuracy or completeness for simplicity; the extent to which a guide should reflect a concern for sustainability of the food supply; to what extent a guide can "stand alone" or be part of a more extensive education strategy.

- Support strategies:

These are strategies designed to support the education process. For example:

Advocacy to influence decision makers to support nutrition promotion and to mobilise social support.

Policy (blueprints for action), can be developed at all levels of society. Apart from national policies impacting on the national food supply, local communities may make a commitment to allocating land for vegetable gardening; a day care centre can have a policy to only serve nutritious foods; a school can develop a policy to allocate specific time to nutrition education.

Community action. Community-based programmes can increase community control over information (relating to food and nutrition); relationships (mobilising social support, facilitating self-help), resources (resource sharing, increasing purchasing power for food) and decision making. Community action can be critical for the sustainability of nutrition improvement.

Regulation. While regulation may be outside the direct sphere of nutrition education, nutrition educators and community members can advocate for certain kinds of regulation. Regulation of the food supply can be a major strategy to support nutrition promotion. Providing enforcement strategies are in place, regulation can ensure the safety of food from many contaminants and agricultural residues. Compositional standards can protect the nutritional integrity of basic food stuffs. Where there is a clearly demonstrated need (not just for marketing purposes), fortification with a vitamin or mineral can address a specific nutritional deficiency. Food labelling laws can provide valuable information to consumers and controls can be exerted over inappropriate or misleading advertising and marketing.

Food production and processing. Many successful nutrition education programmes have been supported by developing participants' skills in growing, processing, and preparing foods.

Raising awareness. Social marketing methods such as media, advertising, and sponsorships, raise awareness of nutrition issues in the community, influence public opinion, and give nutrition education a higher profile. The process of creating broad social support, will often be the first stage in effecting positive changes.

Organisational change. Collaborating with organisations and sectors, such as local government, social organisations, worksites, educational organisations, health centres, and cultural groups, can lead to changes within these organisations which support nutritional improvements. The "healthy hospital", "healthy school", "healthy worksite" and "healthy community" movements are such examples. Achieving organisational commitment to support improved nutrition can be a major factor in the sustainability of programmes.

- Research and evaluation:

Selection of appropriate research and evaluation methods should be made at the planning stage. Pre-intervention data is needed for selecting the target groups, settings, and methods and to try to determine the cost-effectiveness of the proposed programme. Continuous evaluation of the programme for adjustment and change is needed as well as assessment of the final process and outcome results.

- Training and management:

The need and the methods for training need to be decided. As well as the implementors of the programme, secondary and tertiary target groups may need training programmes. Management training is often needed and the methods for managing the programme need to be established.

Conclusions

This framework is located within a health promotion model and broadens the scope of nutrition education to include health enhancement as well as risk factor reduction programmes. By recommending that the social health indicators of population sub-groups, as well as the epidemiological factors are considered, it moves nutrition education towards a focus on people and health rather than disease.

This change in emphasis requires programme planners to consider going beyond communication activities and including strategies designed to provide for environmental and organisational supports for individual behaviour change. The key settings and sectors approach also shifts the emphasis towards creating supportive environments for behaviour change. Achieving changes in organisations to make them more supportive of nutritional improvements will also lead to increased ownership of nutrition issues and make the sustainability of positive changes more likely.

Many countries of the world are faced with rapid social and economic changes, many of which are having a negative nutritional impact on sectors of the populations. Nutrition education can no longer afford to be only "picking up the pieces" after malnutrition has occurred, but must also find a way to promote and enhance good nutritional health in the face of these changes.

Recommendations

(i) Nutrition education programmes should be based on an assessment of the nutritional status and social health indicators of population sub-groups.

(ii) The development of Dietary Goals and/or Guidelines can be a valuable tool for the direction of dietary change desirable in a specific country. Guidelines developed for vulnerable population sub-groups, such as children, should be considered.

(iii) There is a need to develop both risk reduction and health enhancement programmes particularly in situations of rapid social and economic change.

(iv) Planning for nutrition education, and promotion programmes planning, should be based on an analysis of four major interacting components: the nutrition issues of population sub-groups and special needs groups; which in turn influence the choice of target groups; settings and sectors; and methodological approaches. The prevailing nature of the food supply and issues of access and availability will underpin these decisions.

(v) Key settings and sectors for the implementation of programmes should be those which provide greatest access to the targeted population group and which have potential for organisational change to provide long-term support for nutrition improvement.

(vi) Methods selected for nutrition education and promotion programmes must be appropriate for the target group and the setting and preferably include a range of approaches to bring about organisational as well as individual change.

(vii) Methods for both process and outcome evaluation must be included in the planning decision.

(viii) The training and management needs and approaches must be decided at the planning stage.

(ix) Governments should consider policies which support nutrition promotion and education for the population, e.g.

- Regulating food advertising.
- Regulating the promotion of breast-milk substitutes.
- Making provision for health promotion and nutrition education through a tax levy on cigarettes and/or food advertising.
- Implementation of nutrition policy in government worksites to provide a model for other sectors.
- Making nutrition education in schools mandatory.
- Incorporating nutrition and nutrition education goals into agriculture policy.

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PART TWO: A FRAMEWORK FOR THE IMPLEMENTATION OF NUTRITION EDUCATION PROGRAMMES (Suttilak Smitasiri)

Introduction

It is understood that science-based knowledge is available to promote better nutrition and to prevent those who know how to use such knowledge from suffering from most nutrition-related diseases and illnesses. Basically, what causes malnutrition, either over or under, and which essential elements are important to improve such conditions, are now known. Moreover, the necessity to establish appropriate national mechanisms to prioritise, develop, implement, and monitor policies, including laws to improve nutrition within specified time frames, based on both national and local needs, and provide appropriate funds for their functioning, has already been recognised by many leaders around the world (FAO\WHO, 1992). Therefore, it is time to focus more attention on the issue of knowledge implementation.

This paper aims to provide guidance for programme administrators on the implementation of nutrition education programmes. It emphasises, in particular, the processes of maximising the use of available nutritional knowledge to promote better nutrition for the public, especially for those in the less developed countries where nutritional conditions are commonly critical. However, the issues raised could be helpful for developed countries as well.

Nutrition education, in the last two decades, has gone through its own development process. Presently, it is recognised that generalised nutrition education (providing information that a problem exists and describing its parameters) is rarely effective (Worte, 1978; Ward, 1984; Hornik, 1985). Successful approaches, in general, accept that nutritional behaviour is very complex, and that changing this behaviour definitely requires not only cognitive change, but also attitudinal change. Moreover, motivation appropriate to the required action must often be created (Smitasiri, 1994). Nutrition education is thus no longer just imparting information, or bombarding people with nutrition messages, but getting people - everyone from target villagers to national policy makers - to do something differently in order to improve nutrition (Berg, 1993).

Based on the lessons learned in this field, at least two issues should be addressed before attempting any effective national or large-scale nutrition education programme: (i) what really is the major obstacle? Is it a technical or operational issue which inhibits nutrition education's contribution at the present time? and (ii) what should be considered before launching such a nutrition education programme? First, it is argued that the main obstacle in most cases should not be a technical one, since both extensive reviews of nutrition education work by UNESCO and the World Bank in the 1980s (Israel & Tighe, 1984) suggested that the problem with nutrition education was more how the techniques could be implemented effectively. For instance, Israel and Tighe concluded that good techniques were in fact available, but that nutrition practitioners lacked support in utilising the techniques effectively in their nutrition interventions.

Second, both reviews implied that adequate support from leaders and planners is essential to start an effective nutrition education programme. They need to really consider whether nutrition education can be a means to achieve significant goals of nutritional behaviour change. Their decisions and commitment to providing appropriate support for the work are fundamental. As Hornik (1985) put it, "if it is politically unrealistic to expect adequate support for nutrition

education, then it is going to be unrealistic to expect worthwhile consequences". If leaders and planners believe that people need to know how to provide themselves with adequate intake, that they actually want to do it, and that they are able to take appropriate action, they must consider focusing their attention on how to apply appropriate techniques effectively in their contexts. Moreover, they must be realistic about their inputs and the consequences of the process. These particular issues, therefore, need to be considered seriously before launching a national nutrition education programme.

In the following, a generic framework is proposed to guide the implementation of national or large-scale nutrition education programmes. This framework suggests a conceptual process involving three major components: **Decision, Development**, and **Dissemination**, which are considered crucial for programme effectiveness. Each component, together with its elements are discussed. Also, specific recommendations are submitted for international agencies and countries, in order to support more effective nutrition education programmes aiming to improve nutrition situations over the next ten years.

The Decision-Development-Dissemination Approach as a generic framework for effective national nutrition education for the public

The **Decision-Development-Dissemination Approach** is defined as a holistic and systematic framework for implementing an action-oriented programme, with the emphasis on: the decision process necessary to lead the work in the right direction(s), the arts of programme development, and the significance of the dissemination process, in order to maximise nutritional change, as well as increase the programme's sustainability. This framework, as shown in Figure 1, is intended to stimulate the right foresight necessary before the actual implementation of a national nutrition education programme.

Phase 1: The Decision process

Firstly, this framework suggests that an effective national nutrition education programme should start with a sound **Decision** process. Key policy and decision makers need to consider carefully whether nutrition education is a good strategy to improve nutrition situations in the country. In so doing, the process involves at least two essential elements:

- *cause(s)* Why is it necessary to invest in a national nutrition education programme? How much should a country invest in such activities?

- *changer(s)* If necessary resources are provided, will there be capable individuals in the country to manage the expected changes?

Though there were some examples of successful nutrition education programmes in the past, unfortunately, nutrition education approaches were not well perceived by many. Due to lack of confidence that nutrition education works, most countries devote only a pittance of their nutrition budgets to education activities. As a consequence, some experts believe that the potential of effective nutrition education programmes has been impeded (Hornik, 1985; Berg, 1993). Therefore, if Israel and Tighe (1984) are right that good techniques are already available

for implementing effective nutrition education programmes, it is now up to national policy and decision makers to decide on the goals and objectives of their nutrition education programmes and to commit themselves to the implementation of such programmes. Their decision and commitment should be shown in the budgets and the level of involvement in the programmes.

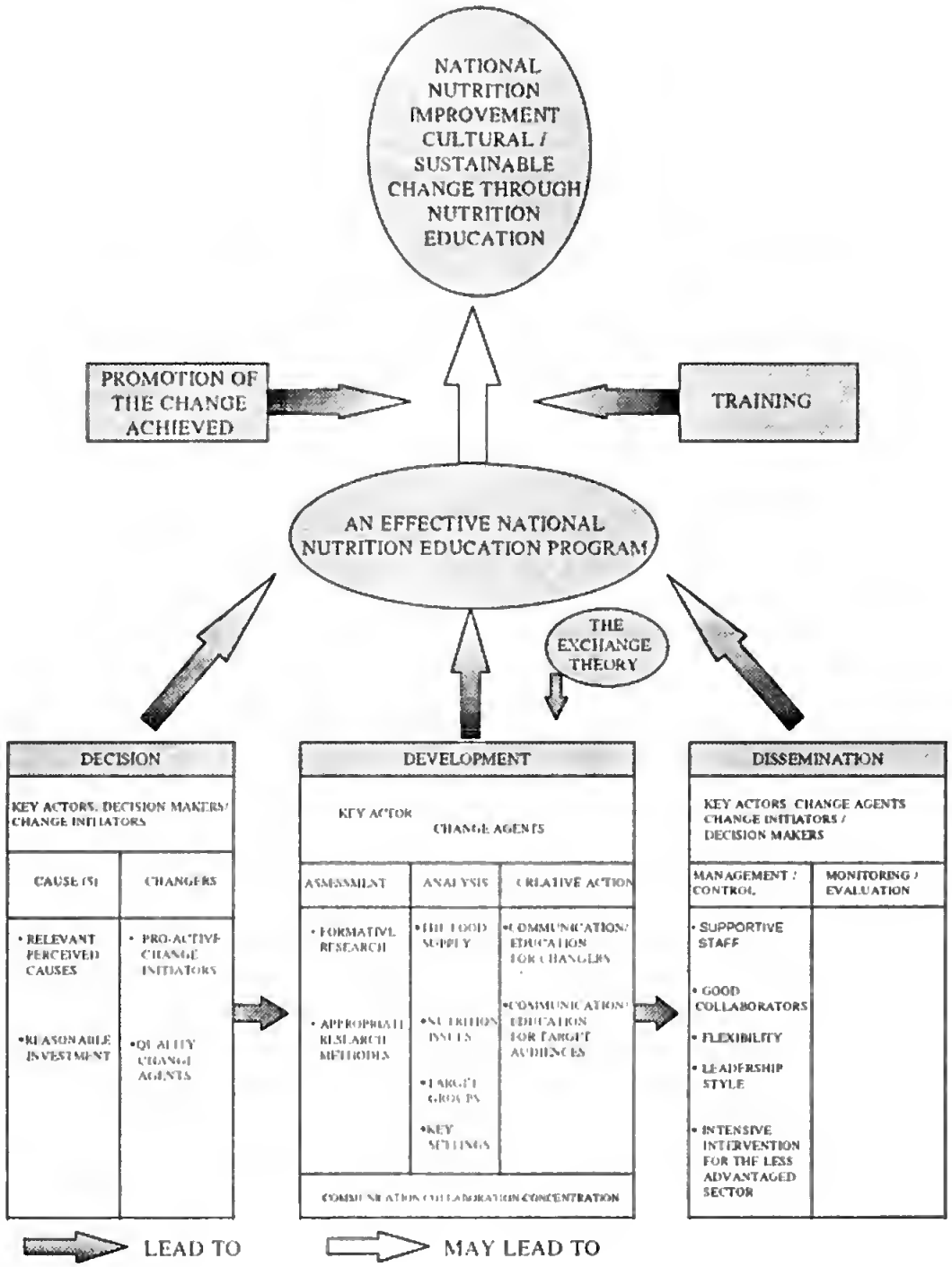
In so doing, they should examine whether the root of nutritional problems in the country is determined by nutritional behaviours. If these behaviours were appropriate, would the result be better nutrition for the public? Nutrition education is a viable policy option when currently available resources at the household level are not producing optimal benefit. Nutrition education can also help people to adapt to current or anticipated changes in the environment (including non-educational nutrition interventions) to improve their nutritional status. Only when national policy and decision makers perceive that changing nutritional behaviours of the population will indeed be more beneficial for their nutrition development in the long run, is it the right time to discuss investing in nutrition education, and a time when nutrition education becomes a reasonable investment for the programme. National policy and decision makers need to perceive that the *cause(s)* of implementing a national nutrition education programme is (are) relevant to their country so that they really find it critical to support such a programme (see Figure 1).

It would be too idealistic, however, to expect policy and decision makers to automatically understand the importance of nutrition education. Therefore, programme administrators and individuals who see the benefits of such intervention for the country - they may be important nutrition scientists, key administrators at the ministry of public health or other related ministries, etc. (in the following these individuals will be called "change initiators") - often need to assist policy and decision makers in this particular process. *This is one of the most crucial steps to be taken at the very beginning of any effective national nutrition education programme.* Nevertheless, records show that this step has seldom been competently implemented.

Thus, it is important that change initiators be "proactive". They must consider policy and decision makers as their target audiences. Knowledge of the process of behavioural change, together with concrete evidence of how beneficial effective nutrition education programmes could be, should be used convincingly so that policy and decision makers perceive nutrition education as a relevant strategy for national nutrition development, and are willing to commit themselves, as well as reasonable resources, to nutrition education activities. They must understand that adequate investment in the right strategy at the right time will definitely result in the effectiveness of their nutrition interventions. Change initiators, therefore, have a major role to play at this initial stage. Their influence, if efficient, will give a national nutrition education programme a good beginning.

The next issue involves another type of changers. These changers usually interact directly with the target audience. They are called *change agents*. Change agents can be individuals at any level from the national to the community level. In general, they adopt the idea of the proposed change and are willing to influence others to change as well. Though change agents can be experts in related fields, government or non-government workers, or community members, etc., those involved more directly with planning and implementing nutrition education programmes, will be the focus here.

Figure 1: The Decision-Development-Dissemination approach as a generic framework for nutrition education for the public



One important reason why many nutrition education programmes fail, is the fact that governments often assign inappropriate people to manage the programmes. Nutrition education, on the surface, looks so simple that anyone can do it and people often say they can. This work, in fact, needs quality change agents with adequate capacity to engage in the behaviour change process (Berg, 1993). Therefore, it is crucial for national policy and decision makers to make a good decision about who should be key change agents for their national nutrition education programmes.

To assist national policy and decision makers in the selection process, some notable characteristics of change agents, which seem to be beneficial to nutrition education work, are suggested below. These characteristics will not be found in an individual change agent. They are suggested as characteristics necessary for a group of change agents who will be actively involved in the implementation of a nutrition education programme. The suggested characteristics are as follows:

- change agents should have the capability to think strategically;
- their ability to understand the target population is crucial;
- they should have talent and creativity to guide the design, development and dissemination of innovative and useful messages;
- they must be willing to use technology (especially communication technology which includes both mass media, small media, folk media and person-to-person) appropriately and creatively;
- an interactive orientation and an ability to work with others as partners in the behaviour change process are indeed essential;
- they must give priority to listening to all involved;
- their aim is to make a difference through education/ communication and collaboration; and
- they should have knowledge of related theoretical and conceptual frameworks, in particular, about what it takes to bring about behaviour change.

. If change agents at all levels have appropriate attitudes towards their responsibilities, it is more likely that the work will be successful. For example, effective change agents are those who usually believe in: comprehensive implementation, co-operative effort, and long-term sustainable change. Also, they often have realistic expectations about the outcomes of education/ communication approaches. Therefore, to increase their chances of successful national nutrition education programmes, governments should be encouraged to make careful decisions in this selection process. If the aim is to use nutrition education as a strategy to improve national nutrition, it is important that people are not only aware about nutrition; they must also be willing to practise what they know to be right in their everyday lives.

Phase 2: The Development process

Secondly, this generic framework emphasises the importance of a national nutrition education programme's Development process (see Figure 1). Once the right decisions have been made to implement the programmes, developing them to the appropriate level of commitment and support is necessary. Issues that are important for the formulation of a national nutrition education programme are described below. In addition to the general procedures guiding effective implementation, this process highlights, in particular, three essential elements.

- *Assessment.* The need for contextual knowledge and information development in order to plan and implement a programme well.
- *Analysis.* It is suggested that critical analysis of the food supply, nutrition issues, target groups, and key settings, as related to nutrition education are crucial to a successful programme.
- *Creative action.* Actions leading to nutritional behaviour change in the population need to be creative. These actions should direct the audiences to move forward in the change process.

Since changing behaviour requires an understanding of people's perceptions and then a responsiveness to those perceptions, it usually requires an assessment of contextual situations. This can be done through what is normally called *formative research*, which is useful as a solid foundation to a problem-solving process necessary for an effective national nutrition education programme (Berg, 1993, Smitasiri, 1994). In terms of methodology, it can be said that any data collection techniques used in social sciences can be applied to collect formative research data for nutrition education work.

Nonetheless, market research and qualitative research have been used more often in this area. In-depth interviewing and focus group techniques are believed to be very useful in obtaining information about the target population. These data are valuable for developing a programme's strategies and designing education\communication messages. Currently, most effective nutrition education programmes report the use of formative research as a necessary assessment before developing intervention strategies for their programmes. Sensible investment in this type of research for a national nutrition education programme is highly recommended.

Moreover, an understanding of the target population, and the ability to analyse this understanding, as it is related to the food supply, nutrition issues, target groups, and key settings are particularly critical for planning and implementing a national nutrition education programme. This process of *analysis* is essential because it allows programme administrators to select the appropriate target groups, the appropriate settings and sectors for programme delivery, and a range of educational and support strategies appropriate to the target groups and settings, in order to have maximum impact on the nutrition issues being addressed.

It is now known that availability of food, people's access to food and the factors determining choice are fundamental to nutritional well-being. A national nutrition education programme, therefore, needs to take account of the food supply (safety and sustainability, access and availability). In general, a national nutrition education programme should play an important role in increasing the capacity of the household to use existing food resources, and sometimes it is necessary to encourage people to produce better food for the family (store, process, and prepare) as well. In the long run, however, such a programme must also be able to develop a nutritionally literate population so that they can make better choices among the new valued-added, processed foods which are now commonly available in the market place. Such choices should be on the basis of nutrition, cost, and household food security. In some circumstances, nutrition education needs to be actively involved in promoting or revaluing traditional foods and practices. Nutrition education planners and implementors should analyse the country's food supply carefully and find the most feasible way(s) to use nutrition education strategies to adjust it in order to facilitate better nutrition for the public.

Identification of the nutrition issues, which is often the starting point of a nutrition education programme, should be based on data obtained by regular national monitoring and surveillance of the dietary intakes and nutritional status of the population. Usually, it is recommended that a national nutrition education programme should promote an understanding of the basic principles of healthy eating. Since food choice and eating behaviour are intimately linked to culture, a people-oriented approach which seeks to modify the social norms of eating behaviour is likely to be effective (Sindall, 1993). Nevertheless, groups with special needs who are at nutritional risk should also be identified and targeted. People who can be influential in the primary target groups should be considered as target groups as well. In addition, tertiary target groups (people who are able to facilitate or support nutrition education initiatives) may include other influential people at all levels (politicians and administrators), as well as people like community or religious leaders. Also, key settings (school canteens, health centres, etc.) can be used to enable population sub-groups to be reached where they are.

Through the processes of adequate *assessment* and good *analysis*, nutrition education programme administrators should be able to develop a sound strategic plan for their national programme. This plan, if it is well developed, can contribute greatly to a programme's success. These elements will benefit the *development* of a national nutrition education programme most if the steps suggested earlier are used by a planning team that recognises the importance of interdisciplinary planning. Before the actual planning sessions, programme administrators should agree to adopt an interdisciplinary framework. They should understand the difference between being a specialist and a generalist, and they should know their roles in the planning team. Thus, the characteristics of administrators and planners themselves are also important to good planning and implementation, since collective efforts are required for nutrition education planning and implementation.

Next, the Decision-Development-Dissemination Approach reveals the significance of *creative action* (see Figure 1). This element, in general, involves creativity in planning and implementing an action programme. The word "creativity", which means the power to bring into existence or the ability to create, is often seen as an alien factor in nutrition work, where the most influential actors are usually trained as scientists. Though scientific training is most important in obtaining more nutritional knowledge, nutrition scientists need to work with others in implementing nutritional sciences in order to improve nutrition in the population. Social scientists, anthropologists, epidemiologists, communication specialists, marketing strategists, etc., must be involved in changing the nutrition behaviour of the public. *This interdisciplinary team should work together to create actions which are able to secure the target audience's attention. The audience should also be able to comprehend the purpose of the recommended actions. Such actions should also guide them to maintain the changes.*

A major action for a national nutrition education programme is usually the communication/education process itself. In general, it is recommended that an effective programme should plan to manage at least two communication/education actions: (i) communication/education actions for changers (change initiators and agents) themselves, and (ii) communication/education actions for target audiences at different levels. Communication/ education actions for changers are necessary, for instance, to maintain the level of knowledge, skills, and motivation needed to implement a programme, to facilitate team-work and indirectly to make changers themselves recognise their importance to a programme. These actions are often

achieved through group communication such as meetings (formal and informal), seminars or workshops, person-to-person communication, and mass media (i.e. newspapers, radio, and television). These communication/education actions are frequently neglected in a national nutrition education programme.

Communication/education actions for the target audiences of a national nutrition education programme should be seen as a comprehensive intervention. Target segmentation is indispensable in order to maximise the effectiveness of the communication/education process. Usually, a comprehensive intervention will involve the use of multi-channel and multi-approach communication/education which is designed to maximise reach and effectiveness through an appropriate combination of community outreach, mass media and folk media, school programmes, and interpersonal communication. These communication/education actions for a national nutrition education programme should have at least three major objectives:

- to create an environment that supports the change,
- to focus on creating well-selected changes which are realistic in the light of the time and resources available, and
- to encourage community participation in the change process.

To create an environment that supports nutritional behaviour change, in other words, to create a nutritionally literate society. The appropriate mass media (i.e. radio, television, printed materials) is normally used to inform the public about important nutritional issues. Several nutrition messages should be strategically communicated through the selected mass media with emphasis on the attractiveness, clarity, and completeness of messages and their frequency. If this intervention is carried out well, outcomes should be expected as follows:

- the public is aware of important nutrition issues,
- the public understands those issues, and
- the level of nutritional information in the community is supportive of the change.

Nonetheless, generalised nutrition education is unlikely to be successful in improving nutrition in the population, no matter how sophisticated education/communication methods are used (Worte, 1978). So, it is recommended that a national nutrition education programme should have its focus on creating well-selected changes. Based on solid nutritional data and population assessments, decisions can be made as to what changes should be initiated in a society in a particular time frame. The social marketing approach is found to be particularly useful for this type of intervention (Smitasiri, 1994).

Once the public is aware and informed, many of them will go through a process in which they want to utilise their new knowledge but they often delay making decisions. At this stage, it is helpful to encourage more community participation in the change process. For instance, creating nutrition action activities in local communities and positive competition campaigns to allow people to try the proposed changes can be helpful in assisting them to experience such changes directly. If the experiences are positive, people will be likely to adopt the changes. Thus, community action programmes should always accompany intangible nutritional information. *There are some enabling factors which can be conducive to creative action in a*

national nutrition education programme i.e. strategic implementation, "self efficacy", effective decision-making process, suitable managerial skills, and appropriate personality of the taskforce are especially noted (Smitasiri, 1994). An effective nutrition education programme requires implementation that secures the desired end. Therefore, carefully developed strategies of a programme action plan are essential to provide clear direction for creative action. Without this direction, it is unlikely that the work will be carried out effectively through co-operative efforts.

When implementing nutrition interventions, especially in less developed countries, it should not be a surprise to find that many lack confidence in doing the work. This is particularly common among those at the grass-roots level where interpersonal communication is most crucial. It is necessary to improve the situation. Initiatives should be taken to develop self-efficacy by helping individuals to strengthen confidence in their capacity to create the desired positive change. *The setting of realistic objectives, the acceptability of the programme, and confidence expressed by the programme team are significant in developing self-efficacy. This should take place through informal and formal efforts at an early stage of the programme.* Programme administrators and their teams will need to spend a great deal of time in establishing informal and formal contacts with several individuals in order to get to know them as people, to understand them in their working conditions, to give them full details about the programme's objectives, and to work with them in setting realistic achievable goals.

Furthermore, an effective decision-making process during implementation is also critical because collaborative decisions are necessary. Concrete information, such as that provided by the formative research, is especially helpful in this process. In addition, facilitating creative action in nutrition education work requires the following of a managerial unit:

- practices grounded in the real situation in which the programme operates;
- attention to the consequences of forcefully applying programme procedures to other related operational units (awareness of goals and objectives of all related inter-sectoral offices is necessary in order to decide how programme procedures should be applied);
- an understanding of existing conflicts among related organisations (its sensitivity to these conflicts is a safeguard for working effectively with each office);
- willingness to cope with existing limitations within the system;
- the ability to make the best of what is available and be willing to assist others to achieve the shared objectives; and
- maximisation of its interactive process by having team members who have personalities suitable for collaborative work (i.e. "nice in nature", "sincere", "respectful" and "hard working").

To summarise, the success of a national nutrition education programme will often be a result of well-organised **Assessment** and **Analysis** processes. However, it is necessary to mention a theory which should be used as a foundation of these processes: the **Exchange Theory** (see Figure 1). This theory states that exchange of any kind does not occur unless there are two or more parties, each with something to exchange and both able to carry out communication and distribution (Kotler & Zaltman, 1971). It also reveals that individuals engage in exchange activities only to the extent that perceived benefits outweigh perceived costs (Fine, 1990). Such

costs can be psychological, or be seen be in terms of time, social status, opportunity, or money. Generally, designing a national nutrition education programme needs the support of:

- good **communication** for assessing, analysing, and taking action,
- good **collaboration** in order to increase social mobilisation and community participation, and
- sufficient **concentration** so as to make the programme relevant to a community's felt needs and wider social development requirements.

Phase 3: The Dissemination Process

Thirdly, this generic framework reveals the significance of a **Dissemination** process (see Figure 1). This process is significant for promoting and securing sustainable change. It consists of two major interactive elements: (i) management/control and (ii) monitoring/evaluation.

These elements are essential for nutrition education because the task is action-oriented in nature. In the following, some issues related to these elements are emphasised.

An effective national nutrition education programme not only needs good planning or excellent design, but also a system that will ensure that everything is implemented successfully as planned. One focal point of this system is, thus, management/control. Usually, the management/control of a national nutrition education programme is likely to be successful if it has, at least, three characteristics (Smitasiri, 1994):

- supportive staff,
- good collaborators, and
- the flexibility of the management/control itself.

Given that programme staff is well selected, it is still important to maximise its ability to work towards the programme objectives. Leadership style and an interactive working environment are most important to gain the support of programme staff. Leaders who are perceived by the staff to be strong, who are willing to allow time and effort to help the staff when needed, who have good listening skills, and who recognise the need for both technical and psychological support, are to be considered. This type of leader will be able to create the interactive working environment (i.e. involve the staff in decision-making processes, provide active participation, encourage group responsibility, create a sense of experiential learning) necessary for an effective national nutrition education programme which requires creative action.

As in any comprehensive intervention, there will be a need to work with others who are not directly involved with the programme. The generic framework specifies that the ability to recruit good collaborators is important for successful implementation. Four criteria for selection are suggested:

- individuals who themselves are interested in contributing to societal change;
- they have previous success(es) in similar activities;
- they are interested in social recognition; and
- they have already established themselves in their work.

Interested individuals who fall into all or most of these categories would be likely to be good collaborators in a national nutrition education programme.

In addition, the intervention's complexity requires that management/control be flexible, especially in the face of difficult and unexpected circumstances. Besides, the need for inter-sectoral collaboration usually demands a high level of flexibility. Therefore, a programme team should aim at controlling a total picture of the implementation; attempts to apply tight control over everything can damage the work. Thus, it is always helpful to have more than one option. Furthermore, to maximise the potential of management/control of a national nutrition education programme, it should be noted that nutrition education interventions in general, do not always reach the less advantaged sector which usually has more nutritional problems. This group needs special assistance because of the nature of the problems it faces, i.e., severe economic hardships, health problems, etc. The less advantaged are often on the fringes of the community which makes it difficult for them to participate in community activities. For these reasons, a special intensive programme for them is necessary in implementing a national nutrition education programme properly.

Effective management/control relies on a good monitoring/evaluation process. The implementation team should always have a clear and accurate picture of what is going on in the target population. Direct observations and regular discussions with the target audiences themselves are helpful. Systematic monitoring/evaluation must be considered whenever it is feasible. Direct involvement of local change agents can provide another channel for monitoring the programme, and formal discussions with these individuals can make self-monitoring a more feasible and collaborative endeavour. A good nutrition education programme also needs a comprehensive evaluation strategy, one which combines both appropriate quantitative and qualitative evaluation methods. An "outsider evaluation" is highly recommended, yet realistic expectations of what can be changed through the approach used are also necessary. Equally important is how to work with interdisciplinary evaluators and how the issue of professionalism is dealt with in order to ensure fruitful evaluation results. Moreover, techniques should be used to guarantee that the evaluation results of a national nutrition education programme are effectively communicated to all involved, including the public.

Lastly, the Decision-Development-Dissemination Approach as a generic framework needs the support of, at least, two other important elements: (i) the promotion of the changes achieved, and (ii) training needs for future implementation. For instance, when the Decision-Development-Dissemination Approach has been applied to a national programme for about three years and the results reveal the achievement of some expected outcomes, this is in fact the first cycle of changes. Thus, to activate the next cycle of change, it is crucial for changers to promote the changes they have achieved. This can be done by launching a forceful public relations campaign directed at multi-level audiences, i.e. national leaders, policy and decision makers, government and non-government workers, local leaders, and the public. The campaign, if well arranged, should result in:

- more support of the activities from important people in the country,
- more understanding about the changes and the benefits of such changes at both immediate and long-term levels, and

- more motivation for individuals, within their own capacities, to participate in the future change process.

This generic framework is aimed at assisting programme administrators in implementing an effective national or large-scale nutrition education programme. It is only written words - useless, if no one is interested in understanding, thinking further, and actually taking action. The effectiveness of the framework itself relies considerably on the quality of the individuals who utilise it. Since an interdisciplinary approach is necessary for a nutrition education intervention aiming to change nutritional behaviour in the population, a taste for interdisciplinary work and for assembling and managing a team will be a prerequisite for leadership of future preventive efforts, including nutrition education (Remington, 1990). Thus, in addition to basic training in education/communication strategies and techniques necessary for nutritional behaviour change, perhaps what is also needed is training which is broadly based in the various areas of understanding essential for implementation. Such training should be interdisciplinary, should go beyond the behavioural and social sciences as necessary, and should offer a basic understanding of human relationships and behaviours and of the solutions to persistent nutritional problems (Lazarsfeld & Reitz, 1975). This type of training is, in most cases, not presently available.

Conclusions

The Decision-Development-Dissemination Approach is proposed as a generic framework to promote good nutrition for the public. This approach is suggested, based on the assumption that science-based knowledge and good techniques are, in fact, available for nutrition education interventions and more attention should be focused on the implementation process. Therefore, it suggests that the processes of Decision, Development and Dissemination be considered with great care when initiating a national or large-scale nutrition education programme.

Firstly, the Decision process mainly involves policy and decision makers, as well as change initiators, as key actors. Policy and decision makers must decide whether nutrition education as an intervention strategy is significant to their country's nutritional development. In so doing, they need to understand the Cause(s) of nutrition problems and to consider how nutrition education could be helpful in improving the situation. If nutrition education is considered valuable, an investment in such a programme should be directly related to outcome expectations. Though policy and decision makers determine what should be done in this process, change initiators play an important role in convincing them to make the right decision. For this reason, change initiators need to be "proactive" and take responsibility for the results of this decision process. Moreover, whoever is responsible for a national nutrition education programme will be critical for its success. Policy and decision makers need to understand that quality change agents are indeed necessary for this type of intervention. They must choose the right ones.

Secondly, change agents play a crucial role in the Development process. They must be qualified to master the communication (assessing, analysing and taking action), collaboration (increasing social mobilisation and communication participation) and concentration (making the programme relevant to a community's felt needs and wider social development requirements, rather than only to nutrition) necessary for the task. Formative research is notably useful. It should be done well by using appropriate research methods. An analysis of the food supply,

nutrition issues, target groups and key settings is essential for developing good strategies which are essential to effective intervention. Furthermore, creative action is required. Programme activities must be implemented not only for the target audiences but for changers as well.

Thirdly, the Dissemination process needs the contribution of change agents, change initiators, including policy and decision makers, in the management/control as well as the monitoring/evaluation of the programme. Management/control is an essential element which determines whether the programme will be implemented as planned. Supportive staff, good collaborators, flexible management and leadership style and intensive intervention for the less advantaged sector are helpful in managing/controlling a national nutrition education programme. Also, direct observations/regular discussions, systematic monitoring/evaluation, comprehensive evaluation strategies, realistic expectations, and techniques to communicate monitoring/ evaluation results are important to the programme.

Nonetheless, the Decision-Development-Dissemination Approach reveals that nutrition planners and implementors should not aim only at an effective national nutrition education programme, but proceed to achieve national nutrition improvement by creating cultural and sustainable change through nutrition education. This can be done by maintaining and expanding the changes achieved through the programme. Promotion of the changes achieved is very important to gain:

- further support from important individuals in the country;
- further understanding of nutrition issues; and
- further motivation for better nutritional improvement.

Human resource development is crucial for any long-term interventions. Training for nutrition change agents should be organised so that they can understand the issues significant to nutritional implementation (i.e. the complexity of human relationships and behaviour), enabling them to come up with better solutions to the problems.

Recommendations

In order to encourage more effective national or large-scale nutrition education programmes, especially in less developed countries (LDCs) for the next ten years, the roles of international agencies and country governments are particularly important. Below, some recommendations are posed for further consideration. In principle, these recommendations support five domains for action (Green & Anderson, 1986):

- build healthy public policy,
- create supportive environments,
- strengthen community action,
- develop personal skills,
- reorient health services; and, any combination of health (nutrition) education and related organisational, economic and environmental supports for the behaviour of individuals, groups or communities conducive to nutrition and health.

(i) It is necessary to create more understanding among policy and decision makers about the significance of nutrition education in less developed countries.

International agencies and country governments should conduct a review of new research findings about diseases and ill health which are caused by inappropriate nutritional behaviours in developed and less developed countries, to highlight the importance of nutrition education. Investments in changing nutritional behaviour are, in fact, for better use of the food supply and for reducing the costs to countries of diseases and ill health. Nutrition education approaches are already available to attempt the changes. In doing so, efforts should be organised first through academic proposals (internationally and nationally) and then through debates on popular media at the country level.

International agencies should also convince national policy and decision makers about the importance of good nutrition and its impact on national development. They should demonstrate to them dramatically what would happen if most of the national resources are spent providing short-term solutions; show them how long-term investments in life style and behaviour change can result in sustainable nutritional development; and indicate through various means of communication the nutrition education solutions which are ready to be used. The messages used should be agreed among the lobbying parties. They should be based on substantial trustworthy arguments and they should be presented in a way that policy and decision makers can understand and be willing to take further actions to support the movement.

(ii) Induct nutrition change initiators and change agents to look at nutrition education as an intervention providing comprehensive nutrition solutions for the public.

International agencies should strategically communicate with active change initiators and change agents in selected countries to point out why nutrition education needs a new perspective (one example is the Decision-Development-Dissemination approach) in order to effectively influence changes in nutritional behaviours in the population. This communication should be made through orchestrated efforts during the initial period.

International agencies and country governments should create accurate understanding about a generic framework for nutrition education, and how it can be helpful if it is applied appropriately. This needs to be done carefully since most nutrition change initiators and agents are often influenced by a biomedical science orientation. Their backgrounds may make it difficult for them to accept the comprehensive and dynamic approach necessary for effective nutrition education.

International agencies and country governments should demonstrate the fact that target populations only need solutions to their perceived problems. With the focus on nutritional behaviours, implementation will be most effective if people perceive that relevant solutions are provided to them and for them. This will not be easy in nutrition education work, because the nature of science-based knowledge available in nutrition is sometimes inconclusive. Nutrition experts need to work on how to utilise their available knowledge to allow others to gain the benefits. Moreover, what target populations need might not

only be nutrition information but also other elements, such as encouragement and necessary resources, in order to solve their problems once they recognise them.

(iii) It is important to initiate more interest among change initiators and agents in the interaction of knowledge and action.

International agencies and country governments need to uncover more evidence in nutrition education work to show that there is a need for more interaction between knowledge and action in this field. They need to encourage more operational research, and to disseminate widely to change initiators and change agents the results of such research, in particular, how this type of research can be helpful in improving work performance.

(iv) It is crucial to selectively implement national nutrition education programme in LDCs, which could provide good examples for this type of intervention later on.

International agencies should provide technical evidence that changing nutritional behaviours is a lifestyle/cultural issue. The nutrition intervention strategy alone may not be appropriate to the reduction of nutritional problems where they are most severe. Nonetheless, a nutrition education intervention can be the best way to create good examples. Since there are certain requirements for this work to be implemented effectively, international agencies should consider providing funding and technical assistance for nutrition education to countries where conditions are more ready for long-term nutrition interventions. The agencies should aim at creating good examples instead of trying to use this strategy to eliminate nutrition problems in a short period of time.

Country governments should assess whether it is possible to organise an efficient unit of operation for effective nutrition education work. An example of what is required has already been discussed in this paper. They should consider carefully how effective change in nutritional behaviours will benefit the nutrition development of the country. If it is really going to be beneficial to the country in the long run, and where and what problem(s) should be taken into consideration so that certain internationally accepted goals for nutritional well-being will be achieved. For instance, the ICN urged governments to "develop comprehensive policies for improved food supplies and nutrition, adapted to local conditions in each country, and support and encourage home gardens, traditional food production and consumption patterns that support nutritional well-being" (ICN, 1992). Decisions need to be made as to what actions are to be taken. Country governments should also commit themselves to national nutrition education programmes, as they are a means to create good examples to enable existing infrastructures to carry on the work afterwards.

(v) It is indispensable to find ways and means to strengthen the responsible units of operation.

International agencies should allocate funding to assist selected LDCs in formal and informal training for qualified change agents.

Country governments should create a mechanism that allows efficient collaborative efforts among government, non-government, and business organisations, in a national nutrition education programme, develop self-efficacy among local responsible units of operation, and provide assistance to improve work performance through operational research.

These recommendations are offered as a guideline to improve nutrition education at a national level, especially in less developed countries. The approach taken is intended to counteract the idea that ineffective nutrition education interventions are the result of a lack of good techniques, the cause being a lack of the support necessary to implement the techniques effectively. Thus, the recommendations focus on how to provide a better environment for national nutrition education programmes, at least, to the extent that more programmes could be expected to be more effective and be good examples for further interventions. Nutrition education is what everyone says definitely needs to be done, but not many really believe in its potential, so, successful examples are sorely needed. If it is true that nutrition education can help protect human beings from some diseases and ill health, a way must be found to demonstrate this.

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Education and communication strategies for different groups and settings

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INTRODUCTION

National food and nutrition policy in developed and developing countries emphasises the improvement of the quality of life of its citizens by striving to:

- stimulate and sustain the production and consumption of more nutritious foods,
- promote proper food habits and healthy lifestyles,
- reduce the prevalence of protein-energy malnutrition,
- reduce the prevalence of micronutrient deficiency, particularly vitamin A, iron, and iodine, among vulnerable groups, and
- reduce over-consumption of certain nutrients, particularly fat, saturated fat, sodium, and alcohol.

With the above objectives, nutrition education and communication are now recognised as a primary form of intervention in national food and nutrition programmes. Some argue that nutrition communication is part of nutrition education. Others maintain that nutrition education is part of nutrition communication. Either way, both are viewed as integral components of other nutrition intervention approaches, such as food production, food assistance, food formulation and fortification, supplementary feeding, promotion of breast-feeding, nutrition-related health services, and the provision of a potable water supply (Stuart, 1991).

The ultimate goal of nutrition education is to produce nutritionally literate decision makers who are motivated, knowledgeable, skilled, and willing to choose proper nutrition alternatives (Lewis, 1976). To be effective, nutrition education must communicate clear messages with a specific behaviour-change goal for target groups (Guthrie, 1978 in Valdecanas, 1985).

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Nutrition education and communication programmes have evolved from a one-way flow of communication, that is, a mere dissemination of information to persuade target groups to change food beliefs, attitudes, and habits. A two-way process of sharing is preferred, where participants in a nutrition programme can freely exchange knowledge, values, and practices on nutrition, food, and related areas. This view of nutrition education as a mechanism for interaction, ensures the active involvement of those who could and should take part in decision making, and in motivating and providing users with easy access to nutrition-related information, resources, and services.

Much of the present work in nutrition education and communication is now viewed from a broader framework as a process, that is, a mechanism for interaction among participants, and as a resource, applying a co-ordinated, multi-sectoral and interdisciplinary effort, toward improving and sustaining the nutritional status of the most vulnerable groups, children and women. Several approaches to nutrition education have been developed and effectively applied over the years. These include: *social marketing, social mobilisation, and development-support communication*. These approaches have basic commonalties: (i) the ultimate goal is to improve the quality of life of people through a participatory process of communication, (ii) there is a demand to establish a dynamic relationship among the participants of the programme: the subjects of the nutrition education intervention, the policy makers, the planners, and the implementors, as well as the evaluators, (iii) information, education and communication (IEC) strategies are built into the process, and (iv) the core elements of the process are: formative research, assessment and analysis; capacity building; development of a multi-channel communication strategy; community organising; networking, alliance-building, and co-ordination with linkage and support systems; design, pre-testing, and development of messages and materials; and monitoring and evaluation.

Social marketing

Social marketing reflects the view that merely providing information is not enough to change behaviour. A host of psychological, socio-cultural, political, environmental, and practical factors impinge on the decision making process toward behaviour change. New strategies are needed to motivate people to adopt change and take an active part in their development. Social marketing uses business marketing principles to advance a social cause or idea (Kotler & Zaltman, 1971). It is described as "a social change management technology that involves the design, implementation and control of programmes aimed at increasing the acceptability of a social idea or practice in one or more groups of target adopters" (Kotler & Roberto, 1989). The strategy adopts the four Ps of marketing, namely product, price, place, and promotion. In the last 20 years, social marketers have been involved in promoting better health and nutrition in the developing countries of Asia, Africa, and Latin America. A great deal of experience has been documented in the social marketing of breast-feeding, weaning foods, oral rehydration salts, and immunisation (McKee, 1992).

Social mobilisation

Social mobilisation is described by UNICEF as:

> *"a process of generating and sustaining the active and co-ordinated participation of all sectors at various levels to facilitate and accelerate the improvement of the situation of children, women, and other vulnerable groups. The need for social mobilisation is based on the following concerns: (a) children, and often women, are powerless; (b) programme resources for solving problems are limited; and (c) concerns for children and women go beyond a project basis. The aims of social mobilisation are to hasten the delivery of basic services and to promote convergence and generate resources for children and women's programmes"* (UNICEF, 1995).

To generate commitment and action among those who can contribute to the solution of social problems, certain strategies are employed that put prime importance on interpersonal communication. The six strategies include the following:

Advocacy

Advocacy among policy-makers, key personalities, groups and organisations. Advocacy is a planned communication effort to persuade decision makers at policy, planning, and management levels to adopt necessary policies and allocate resources for a cause.

Information, education, and communication (IEC)

IEC approaches are used to reach target groups. Social mobilisation uses all available and potential communication approaches, resources, techniques, channels, methods, and tools. It is not a mere information campaign or communication project, but a long-term programme built into the sectoral programmes of a community. Some examples of IEC activities are:

- the development, production and distribution of appropriate printed materials such as brochures, pamphlets, posters, leaflets, and flyers;
- radio spots, plugs, jingles, documentaries, and schools on-the-air;
- video and other audio-visual materials like slide-tape presentations and film showings; and
- messages integrated into communication programmes, services, and products of allied agencies.

Training of programme implementors

Training enables personnel to acquire the necessary skills for the delivery of services. The implementor also uses training to improve people's knowledge, appreciation, and mobilisation, of community resources to achieve the desired outcome, usually for local and individual empowerment.

Community organising

Community organising to empower parents, families, groups, and the whole community, is used to build their capacity for problem solving, decision making, and collective action, thus developing and strengthening their networks. Community organising allows community members to recognise their problems and needs, decide on what they can do and how they can act collectively, that is, pool ideas as well as human and physical resources, and together benefit from all available resources and services.

Networking, establishing linkages, and building alliances

This includes networking, establishing linkages, and building alliances with those who can actually and potentially act on the problem. The implementor of social mobilisation builds alliances and linkages not only with families in the community, but also with institutions, agencies, and organisations. Among potential allies of the community are the non-governmental organisations (NGOs), people's organisations, self-help groups, and local government executives. These networks allow communities to maximise limited resources and services to a level where their inputs have a much greater impact.

Monitoring and evaluation

Monitoring and evaluation determines the efficiency of programme implementation and the effectiveness of the strategies used in achieving defined goals. The results are used to adjust the programme as needed to improve impact and maximise resources.

Development support communication (DSC)

DSC is described as "the systematic utilisation of appropriate communication channels and techniques to increase people's participation in development and to inform, motivate, and train rural populations mainly at the grassroots level" (FAO, 1987). The DSC approach is seen as a system with three sub-systems that provide the framework for planning, implementation, and evaluation. The sub-systems include: (i) DSC action plan or process model; (ii) DSC training plan; and, (iii) DSC management plan (Stuart, 1994), and are briefly described below:

The DSC action plan or DSC process model

The DSC action plan, or DSC process model, provides a systematic approach to changing and exchanging knowledge, attitudes and practices. It is adaptable to diverse development contexts and situations and thus allows room for adjustments according to local realities. It has four major stages: pre-planning, planning, implementation, and post-implementation with corresponding steps and activities.

The DSC training plan

As a sub-system, the DSC training plan recognises the importance of capability building in DSC and relevant technologies for all participants in a development programme where a DSC

component is in place. The training promotes the sustainability of the programmes. There are eight steps in the training planning process: training needs assessment, setting training objectives, selection of training format, preparation of curriculum content, development of training support materials and media, training proper, evaluation, and planning for echo-trainings.

The DSC management plan

The DSC management plan is an essential part of the DSC system because orchestrating people, resources, and time requires a systematic management programme. Sound programme or project planning, implementation, and evaluation depend on good management. This involves planning, staffing, budgeting, controlling resources, guiding and co-ordinating people's activities, setting policies, guidelines and standards, and monitoring and evaluation.

BACKGROUND

Currently, there are evaluations of nutrition education programmes available that support the benefits of a healthy diet. The challenge for nutrition educators is to find ways of reproducing positive results routinely and on a large scale. Given the limited resources available in most developing countries, nutrition education and communication strategies must be able to reach large sections of the population in a cost-effective manner.

Mass-reach programmes are needed, not only to address existing nutrition problems, but also to promote the general nutritional literacy and health of the population, particularly because in many countries the food supply is in transition and persuasive food advertising is increasing.

The key programmes that can reach a large number of people include:

- community out-reach programmes
- mass media campaigns
- pre-school and school programmes
- work-site programmes

STRATEGIES FOR COMMUNITY OUT-REACH

Identifying key nutrition issues and analysing determinants of eating behaviour

The task of planning nutrition education interventions integrated into nutrition improvement programmes, requires that the various causes and effects of nutrition issues and problems be addressed in a concerted manner. Only through a systematic analysis of the nutrition and health-related needs of a community, can an effective nutrition education programme be developed.

Any nutrition education intervention should consider the socio-cultural, economic, political, and technological environments which include food and nutrition issues. Thus, the first step is a situational analysis examining the factors that would draw out pertinent issues to be addressed through nutrition education.

The step of identifying and analysing key nutrition issues and behaviour determinants is part of baseline or background research that involves three components (FAO/WHO, 1992): (i) an epidemiological analysis of the specific nutrition issues; (ii) a policy analysis of national nutrition priorities and resources; and (iii) a behavioural analysis to identify the barriers for adopting the desired behaviours, as well as factors that favour change.

The next step applies the first two A's in UNICEF's "Triple A" Approach, consisting of *Assessment, Analysis and Action* (UNICEF, 1992). An *assessment* determines the priority issues, problems, local power structures, supporting institutions, communication resources, as well as relevant policies, and the degree to which these affect the state of nutrition and health of the community. An *analysis* studies the underlying factors that impinge on the issues, problems, structures, resources and policies. *Action*, in terms of community out-reach strategies, includes: consultations with decision makers at different levels to find out their needs for information; planning and preparation of easily understood messages and materials; and social mobilisation of the community as a way of motivating people to cooperate and share limited resources and of empowering community decision makers, be they the local leaders, teachers, mothers, or school children.

In designing appropriate community out-reach strategies, nutrition education planners need two major types of information. These are: (i) *information about people*, and (ii) *information about local resources* (Stuart, 1991).

Information about people

Information about people is sometimes referred to as audience predisposition in communication models (Gillespie, 1987). The information about people will help identify the nutritional needs of the community. It includes:

- Nutritional status:

Four basic methods are employed to describe the nutritional status of "at risk" groups in the community: anthropometric studies, clinical studies, biochemical studies, and dietary intake studies.

- Food consumption patterns:

This describes what and how much people usually eat. It determines whether the amount and variety of food intake is adequate for the individual and the household. It also tells if there is food scarcity at certain times of the year.

- Medical information:

Morbidity and mortality rates and their causes are indicators of the interrelationships between nutrition and prevalent disease patterns, including infections and infestations.

- Education:

Literacy and educational levels are guides in designing appropriate messages adjusted according to the audience's level of comprehension and language facility. It also guides planners in choosing interpersonal and mediated approaches.

- Media access and exposure:

This indicates the extent to which the community has access and is exposed to certain mass media channels, while it determines the community's media habits, ownership, and preferences.

- Economic status and education:

Types of occupations, incomes and educational attainment of family members, and whether women work outside the home, indicate if money is regularly available to buy food. Food expenditures also provide an index of the percentage of family income spent on food and non-food items. Child care providers should also receive nutrition education.

- Cultural information:

Food habits, practices, superstitions, attitudes, social and religious customs, and breast-feeding and weaning practices are useful in determining and designing appropriate nutritional messages and activities.

- Food and nutrition information networks:

The structure and flow of nutritional information or misinformation among women and men in the community help to identify specific target participants for nutrition education interventions, e.g. sources of erroneous beliefs about breast-feeding and weaning, superstitions, etc.

- Studies on functional classification:

These studies relate nutrient deficient patterns to spatial, ecological, socio-economic, and demographic characteristics of a population. For example, a study of upland dwellers can yield useful information for designing intervention programmes based on an "area level", integrating a development planning approach rather than a sectoral approach.

Information about local resources

Information about local resources that will help identify problems related to food and nutrition in the community include:

- Water supply:

This helps to identify possible sources of infection and whether enough water is used to maintain hygiene standards. It also indicates if it is possible to increase agricultural production.

- Local food production:

This identifies the kinds of foods that are locally available for consumption, including their seasonal availability.

- Markets and foods:

This gives an idea of what crops are sold locally, the process by which a quantity and quality of foods becomes available on the market, and the presence of street-food vendors, snack stands, and other outlets for prepared food.

- Food storage:

It should be determined whether food storage facilities are available, whether enough food can be stored properly for future needs, and whether lack of storage facilities causes specific losses and a shortage of supplies.

- Housing:

This indicates the adequacy of kitchen, toilet and other sanitation facilities. It is also used to measure space adequacy or crowding among family members.

- Local institutions, policy, and support services:

This shows whether the local government officials recognise the importance of nutrition in the overall development plans and programmes in their area of jurisdiction. It also determines if there are existing policies that guide local officials, organisations, extension agents, and non-government organisations so that they can participate and provide support services for nutrition interventions.

Transportation facilities:

The availability of farm-to-market roads and public utility vehicles affects the flow of farm products to the market, the availability of food in the local market, and the mobility of individuals to visit health and educational facilities.

- Educational and communication resources:

The availability of these resources indicates the extent to which the members of the community have access to instrumental information and to formal, non-formal and informal education.

A community diagnosis is carried out by collecting the information listed above, either from primary or secondary data. Whichever information-collection method is used, the people from the community are the focal participants in this initial planning step. Some techniques that have been used for drawing out needed primary information are the participatory rapid appraisal or PRA technique, focus group discussion or FGD, problem tree analysis, village assembly, dialogue and consultation, communication network analysis, and community survey.

Selecting target groups

The members of a community can be divided into specific groups, or segments of participants, for a community out-reach programme based on information made available. *Audience segmentation* is the term used for planning a nutrition education and communication intervention when a population is divided into fairly homogenous groups. Each group may then be selected for distinct nutrition education messages. The basic premise is that everyone in the population does not have the same need for a particular piece of information, resource or service. Hence the need to segment target groups.

Target groups can be segmented according to the following characteristics:

Social demographic characteristics

These include age, sex, educational level, economic class, marital status, family size or number of children, race, religion, language/dialect, occupation, membership of organisations, media habits, geographic location (urban-rural; tropical-temperate), etc.

Practices

Food habits, breast-feeding and weaning practices, methods of food preparation, backyard gardening, cropping patterns, etc.

Psychographic characteristics

These include common lifestyles, social role, the manner in which a person thinks, feels and responds towards a specific nutrition and health-related behavioural issue. They include customs, traditions, indigenous belief systems, values, and other social-psychological traits. Current marketing practices place a heavier emphasis on psychographics than they do on demographics.

Examples of target groups for nutrition education are: the women in the community, school children, community health workers, teachers, political and religious leaders, and other field-workers, to name a few. These target groups may be further subdivided into more specific groups whose unique traits demand a particular message and strategy. For example, the women may be further segmented into groups of pregnant women, lactating mothers, and mothers of children from six months to six years of age. Other segments of women could be teenage daughters and mothers-in-law. Another important issue in audience segmentation is whether the central nutritional concern is under- or over-nutrition. Accordingly, the appropriate messages are designed and packaged.

The target group, based on the priority issue to be addressed, may be classified according to *primary, secondary, and tertiary target groups*. For example, when promoting vitamin A-rich foods in the community, the *primary participants* are the child-care practitioners, such as mothers, grandmothers or mothers-in-law, teenage daughters, and other siblings. The *secondary participants* are the community nutrition/health workers, teachers, and local political and religious leaders who could teach, support, and reinforce desirable practices, values and beliefs in the primary target group. The *tertiary participants* are those whose expertise and official positions, even if they are not from the community, could serve as valuable sources of information and support. This group could include provincial and district level development personnel in health, education, and agriculture, as well as university researchers, and marketing and communication/media specialists.

Establishing existing levels of nutrition knowledge, attitudes, and practices (KAP)

The primary target groups of nutrition education in most cases are women, because they tend to make the decisions when it comes to food, nutrition, and health concerns of the family. Specifically, these women are the pregnant and nursing mothers, mothers of infants and pre-schoolers (up to six years of age), and mothers of elementary school children. In some cultures the men control the allocation of food resources within the household, determine the mode of infant feeding, food preparation, and use of medical services, etc. Therefore, they may need to be targeted as a primary audience for nutrition education as well. In all cases, formative research is necessary to find out existing levels of KAP in the target groups. This activity will identify the gaps or needs in KAP that could be addressed through nutrition education.

Nutrition messages addressed to the target groups are concerned with eliciting specific behaviour changes in *what they know* (knowledge of nutrition and health, food beliefs and superstitions, taboos and misconceptions); *what they feel* (attitudes, values, and preferences for certain foods and food preparation and child-feeding practices); and *what they do* (food habits, food preparation practices, customs and traditions, child-feeding practices, cropping system, etc.).

Food beliefs, preferences, and habits of the whole family are passed on from generation to generation, and become customs and traditions. They dictate the homemaker's decisions on food selection and preparation. However, many food beliefs and preferences unknowingly lead to poor nutrition and health problems. Hence, a community out-reach programme on nutrition should also address the need to: (i) change the KAP of the homemakers and their families that lead to, or aggravate nutritional problems; and (ii) reinforce behaviours that promote family nutrition and health.

Setting communication objectives

Setting communication objectives is an important step in planning nutrition education and communication programmes. The foremost consideration is that the participants, the planners, and the message and media developers, define together the specific outcomes expected over a given period. There must be agreement among the participants on the problem to be addressed, the need for change, the need to take action to prevent or reduce the problem, the strategy by

which the change can take place, and the indicators by which such change could be recognised (Valdecanas, 1991).

Communication and educational objectives are stated in terms of the participants' desired behavioural outcomes, that is, in terms of the desired degree of change in what they know, feel, or can do. The results of the KAP study among the primary, secondary, or tertiary target group, as the case may be, provide the basis for setting the objectives.

Clear and well-defined communication objectives guide message designers and media/materials developers in selecting content, developing appropriate communication strategies and media mixes, and planning monitoring and evaluation schemes. Some useful memory guides in formulating communication objectives are:

A-B-C-D: Audience, Behaviour, Condition, and Degree

Example: "At the end of six months, 75 percent of the mothers with infants and pre-school children in Barangay San Pedro will have adopted and prepared on a regular basis vitamin-A rich recipes learned from the Mothers Class."

S-M-A-R-T: Specific, Measurable, Attainable, Realistic, and Time-bound

Example: "After one year, 95 percent of mothers with nought to six month-old infants in Los Baños will be breast-feeding their babies and for longer periods than observed a year before."

Developing and pre-testing messages and materials

With adequate background information about the target groups and properly defined objectives, the next step is to develop a socially and culturally appropriate communication strategy, consisting of *approaches, messages, and methods*. Approaches chosen are those appropriate for each group. These could be a combination of any of the following: *individual, group, or mass approaches* using *information, education/training, motivation, entertainment or advocacy*. Messages vary according to the kinds of behaviour-change specified in the objectives, the available resources and services, technologies, other relevant information, participant needs, and method of delivery. In order that each approach be used, activities must be defined according to the programme objectives. Appropriate messages, media, and methods should be designed and pre-tested according to the audience's abilities, resources, and preferences.

Media and materials should ensure that target groups receive the message and act on it positively. Materials need not be expensive, for low-cost materials can be as effective. For example, a streamer can be made from used feed or flour bags, or a poster made from the back of old glossy calendars. Involving the community in making the materials is an effective way of getting the message across. For example, the feedbag streamer could announce the coming of health workers on immunisation day. A poster may carry a motivational message, such as "Mother's milk is best" or "Use iodised salt".

Pre-testing prototype materials, or formative research, is a very important step in message and media development. At the pre-testing stage, the message designer aims to discover any misunderstandings, misconceptions, or shortcomings in either the message or the medium that must be corrected and improved before the material is finalised, reproduced, and distributed. Pre-testing measures the reaction of a small but representative sample of the target audience to a set of communication materials. Materials may include posters, pamphlets, radio or video material, audio-visual materials for training support, and others. The developer designs two or three alternatives of a given material and tests them with representatives from the target audience. The materials should be found to be: attractive, easily understandable, credible, persuasive, culturally appropriate, memorable, and important to the audience (Bertrand, 1978).

Mobilising social support and community participation

Social mobilisation serves as the strategy for motivating mothers, children, families, groups, and communities to become active participants in meeting their food, nutrition, and health needs. It provides the framework for action that links up various sectors at all levels in making available all possible means and resources toward improving the nutritional and health status of women and children (UNICEF, 1995).

Five factors influence the nutrition and health situation of vulnerable groups in a community which may affect participation. These include:

- socio-economic and political environment - e.g. the lack of political will among local government executives to improve the situation and the poverty and social problems besetting the community;
- local culture - e.g. the traditions, customs, and superstitions which inhibit acceptance of correct practices;
- access to programme services - e.g. when there are few doctors, nurses, health workers, and community volunteers;
- technologies and resources - e.g. lack of qualified personnel and unavailability of facilities for service delivery; and
- home environment - e.g. when the parents' level of knowledge and attitudes are constraints.

The five components of social mobilisation can, in turn, enhance the positive contribution of the above five factors. These five components are: (i) advocacy; (ii) Information, Education, Communication (IEC); (iii) community organising; (iv) training; and (v) monitoring and evaluation. Through advocacy, the social mobiliser seeks the support and commitment of these sectors to facilitate and accelerate the improvement of the situation of women, children and other vulnerable groups. The decision is in the hands of national and local officials, opinion leaders, the media, and civic, political and religious organisations, in other words, those who have the authority to enact laws or allocate much needed financial, physical, and manpower resources. Through IEC, all concerned sectors, including the target groups, are informed of the problems and motivated to participate in community activities. Community organising allows the community to unify and collectively act to seek solutions to their problems. Training maintains the commitment of field-workers and implementors as it integrates new techniques to their work.

Monitoring and evaluation provide feedback on how to improve strategies and measure goal attainment (UNICEF, 1995).

Strengthening community action and participation

A DSC project in the Philippines has several factors which involve community action and participation, and which have empowered the people and assured the sustainability of project interventions. The DSC approach is not just a media effort. It is a multi-directional process which can cause a synergism among the target groups, field-workers, implementors, and local leaders, toward participation, empowerment, and sustainable development interventions. Participation happens when people concerned are committed to organise themselves so that they can collectively get involved in making decisions about various economic, social, spiritual, environmental, and political spheres of community life. Participation helps them realise a true sense of empowerment when they are in control of their talents, time, resources, and achievements, that in turn ensures the sustainability of their initiatives (Stuart, 1994).

Factors that can strengthen community action and participation for empowerment and sustainable programme interventions:

Social preparation

Activities classified as social preparation start at the research, assessment, and analysis stage, when local people are conscious from the start that their ideas, problems, needs, preoccupations, and aspirations contribute to the planning and implementation of the intervention strategy. The interactions among the local people, their leaders, and the programme implementors in orientation meetings, site visits, focus group discussions, construction of a community profile, spot map, or problem tree, allow all involved to discover each other, draw out potentials, and establish or deepen friendships. More significantly, they are introduced to new contacts from outside the community that could be instrumental in meeting their needs. For implementors and field-workers, the training is a form of social preparation too.

Sense of ownership of the programme

A sense of ownership of a programme or project in the community by the target groups, the local government executives, and the community, is a key to active and productive participation. Ownership refers to the highest level of commitment to a programme. For the local people, it is like formulating the programme plan themselves, because they have been intensively and extensively involved in the planning process. Thus, if they feel that they are stakeholders, there is minimal need for other motivators, because ownership is itself the motivator. However, this sense of ownership must be coupled with a sense of responsibility and accountability.

Regular interpersonal communication

The target groups, their local leaders, and the implementors must agree to interact regularly through meetings, seminar-demonstrations, and the like. There is no mass media substitute for face-to-face contact, especially where timely advice, resources, and services are

needed. Whether these interactions are weekly or monthly, all participants should develop the "habit" of anticipating and attending them.

Co-operation and respect among different programme participants

A spirit of co-operation and respect among the people involved in the programme is the basis for *opening the lines of communication* and thus encourages *caring and sharing, collective decision-making, and team-work*. Programme failure is often attributed to the fact that these basic affective states are taken for granted and not consciously nurtured.

Active involvement and commitment of development workers in all stages of programme development

The participation and manifestation of commitment by health/nutrition workers, whether as government service providers or volunteers, is essential. These persons have the important roles of linkage builder, facilitator and catalyser. As providers of front-line services and information, they have direct access to the target groups and are often regarded as credible sources of information. As such, they can persuade target groups to adopt correct practices and participate in programme activities.

Organisational maturity of the community

Experience has shown that communities with a good level of organisational development are the ones that take off faster when programme interventions are introduced. This is because they already have a system for dealing with decisions and problem-solving. It also takes less time and effort for them to organise new groups as needed, and to maintain a system for regular interpersonal communication and interaction.

Linkages and alliances with government and NGO support systems, media and those who can contribute to problem solution

Policy-makers and those who make decisions on fund and resource allocation must be *made to recognise and become responsive* to the problems affecting vulnerable members of the community: the infants, children, and women. The first step is to initiate discussion to generate political will, commitment, and action. Examples of these potential allies and support systems are government agencies, political parties, religious organisations, trade unions, social welfare organisations, professional associations (e.g. of doctors, nutritionists and dieticians, communicators, lawyers, etc.), multinational companies, business clubs, advertising agencies, media organisations, etc. These linkages and alliances should widen the perspective of community leaders, and the residents in general, on the opportunities open to them in generating resources and various forms of assistance, as well as livelihood activities.

Establishing evaluation methods, programme communication strategies, and management skills at the local level

Evaluation is integral to each stage of a programme intervention, from pre-planning, planning, and implementation, to post-implementation. The traditional view of evaluation as a purely *ex post facto* activity has shifted to its current use which also includes *ex ante* and ongoing activities during programme implementation. Evaluation is defined as "the process of delineating, obtaining, and providing useful information for judging decision alternatives" (Stufflebeam, 1981). In other words, evaluation provides useful information that will help in decision-making, and ascertaining the value of the intervention strategy in each phase of the programme. Evaluation information on the audience's level of KAP is needed to design an appropriate communication strategy, i.e. on whether to alter or make improvements on the strategy, whether resources are being used as planned, whether the programme has accomplished its objectives, and whether observed changes can be reasonably attributed to the intervention.

Evaluation is a special form of applied research designed to produce quantitative and qualitative data for decision-making. Before the intervention, the evaluation activity is classified as baseline or background. Evaluation of materials, protocols, or activities is called formative evaluation. Evaluation during the programme implementation is called process evaluation. Finally, the evaluation activity after the intervention is completed, is classified as summative or outcome. Evaluation methods for each stage of a programme can include the following:

Context evaluation during pre-planning

The purpose of this type of evaluation is to identify behavioural change objectives and system goals, by exposing problems, unmet needs, and unused opportunities. Some evaluation methods for this stage are situational analysis, problem identification and needs assessment, focus group discussion, key informant panel interview, KAP study, and community survey.

Input evaluation during planning

The purpose of this evaluation activity is to develop and analyse one or more alternative designs or operational strategies. Examples of evaluation methods for this stage are pre-testing of communication materials, piloting of a communication strategy or media mix, and feasibility study.

Process evaluation during implementation

The purpose of this evaluation activity is to detect or predict defects in the procedure or strategy, including management, for possible modification, adjustment, refinement, improvement or deletion. Process evaluation is a function of the adequacy of context and input evaluations. It provides feedback to implementors, identifies potential sources of failure, maintains a record of methods used in the programme, and monitors, controls, and documents intervention procedures. Process documentation techniques, monitoring procedures, and feedback gathering are some methods used in this type of evaluation.

Outcome/output evaluation

The purpose of this type of evaluation activity is to measure and interpret attainments based on objectives and provide information for policy and any decisions about future programme recycling. Examples of evaluation methods for this stage are post-test, effects (behavioural) evaluation, and impact assessment.

Programme communication strategies are made up of a mix of interpersonal communication channels, community media, and mass media. These are planned on the basis of the community members' resources (radio and TV ownership, availability of electricity, free time), abilities (literacy rate, education), and predispositions (preference, motivation, willingness to participate).

Management skills are not the monopoly of programme implementors. Community-based implementors such as local leaders and health and nutrition personnel should also be trained in management skills. This is why management training should be part of the training plan of any programme. As discussed above, management skills include planning, staffing, budgeting, controlling resources, guiding and co-ordinating people's activities, setting policies, guidelines and standards, and monitoring and evaluation.

A programme management plan *lists management related activities* for each stage of the intervention in an action plan. This is usually presented in a Gantt Chart that specifies what activities will take place, the dates and duration, expected output, and individual or team responsibilities. A co-ordination scheme is also established, which includes schedules for regular management meetings, home visits, workshops, and reviews. The plan includes a *programme for staff training*. The manager analyses where the existing skills are inadequate to perform specific jobs. She or he also identifies trainers, sets training dates and prepares evaluation tools to determine impact on job performance, and potential multiplier effects on others. The manager is also responsible for *costing major activities according to the approved budget*. A nutrition education intervention must project budget requirements for: (i) research and evaluation activities - costs for focus group discussions, consultations, meetings, field surveys, etc., including materials and snacks; (ii) media development - costs for designing and revising prototype materials, mass production and distribution; and (iii) staff training - costs for trainer's fees, travel, daily allowances of participants, training materials, food, and accommodation. Another important management responsibility is *setting policies, guidelines, and output standards*. Smooth implementation is assured when management specifies and adheres to operational guidelines and policies on reporting, job performance, use of equipment and vehicles, and standards for outputs such as progress reports, minutes of meetings, trip reports, and financial reports.

Developing policy initiatives - at the local level

Any nutrition education intervention should be educational to all sectors at all levels. Through advocacy efforts, programme implementors can generate commitment and action from decision makers to provide the necessary resources to improve the nutritional and health status of vulnerable groups and the entire community. Such commitment and action must begin from the

national and local political leaders who have the power to enact policies and legislation that would commit resources to solve specific problems.

For example, the Department of Health in the Philippines has effectively adopted a national policy to implement the Expanded Programme on Immunisation (EPI). It is a successful example of a partnership between the government and a local community for development. At the national level, a high sense of political commitment was manifested in order to provide all the resources needed to accelerate programme implementation at the community level. In 1986, former President Corazon C. Aquino signed Proclamation No. 6 implementing the EPI. The aim was to immunise infants against six deadly diseases, namely: childhood tuberculosis, diphtheria, pertussis, tetanus, polio, and measles, and to immunise mothers of child-bearing age against tetanus. After five years, the Philippines was cited as one of a few countries that had achieved the Universal Child Immunisation target. Upon assuming office in June 1992, President Fidel V. Ramos ensured its sustainability and reaffirmed the government's commitment to the Universal Child and Mother Immunisation Goal by issuing Proclamation No. 46. At the same time, he launched the National Immunisation Day (NID), scheduled every third Wednesday of April and May from 1993 to 1995. The NID aims to provide a higher coverage of immunisation for Filipino children under five years of age and to eradicate polio in the Philippines by 1995. Other countries, notably Vietnam, Cambodia, China, and some Latin American countries, have expressed interest in adopting the Philippine experience.

SCHOOL PROGRAMMES

Developing curriculum support

It has been long recognised that undernourished children do not learn as well, are more susceptible to illness, and miss more days from school than well nourished children. Schools provide the logical place to intervene with children in order to improve their health and nutritional status. Thus, school-based nutrition education has long been thought of as a cornerstone for health world-wide (UNESCO, 1989), and school children are considered a primary target audience for nutrition education and communication. Nutrition education in schools relies primarily on classroom curricula, school feeding programmes, or a combination of both approaches.

Classroom instruction in nutrition can be offered as a separate, stand-alone subject, or it can be integrated into other subject areas. Traditionally, nutrition is taught as a stand-alone subject or as a unit in the health or home economics curricula. This teaching method has emphasised certain topical issues within nutrition, including the three (or four) basic food groups or food guides, the concept of a balanced diet, and food sources for specific nutrients (such as protein, iron or vitamin A). Teaching techniques are generally lecture-based, but may also include role-playing activities and games. These curricula tend to be designed for knowledge change rather than behaviour change. The booklet produced by Helen Keller International (1993) is a typical example of this approach. Several "how-to" resources are available for designing school curricula based on this model (Oshaug, Benbouzid & Guilbert, 1988).

The purpose of food guides is to present a practical daily plan for food selection for use by the general public. Most have been developed by a "top down" approach in a variety of

graphic forms (food wheel, pyramid, target, plate, standard blocks, etc.). Few of these graphics or guides have been evaluated for effectiveness. There are also a number of other issues raised about food guides. These include the extent to which a guide should reflect the current food supply and food practices or whether it should represent an "ideal", the extent to which guides should sacrifice accuracy or completeness for the sake of simplicity, the extent to which guides should reflect a concern for sustainability of the food supply, and the extent to which a food guide should "stand alone" or be part of a more extensive education strategy. Other issues frequently raised are, whether the food guides should address only the daily "foundation" diet or total intake, and whether a country should have several food guides (for different ages and needs) or only one to improve consistency.

Overall, the intent of food guides is appropriate and desirable. Their functionality and impact, however, will depend on their developmental process and fit with the target audiences' perceived needs and desires. Most food guides probably need revision in order to meet these considerations. However, a food guide that makes sense to the target audience is a valuable addition to the curriculum.

One of the drawbacks of a "stand-alone" curricular approach is that nutrition will often not be taught if it is not required of teachers to do so. In addition, when nutrition is taught in this fashion, it may become disconnected from everyday life and the other subject matter in the school curriculum. Students may then have difficulty in integrating the nutrition information into their own life practices and/or relating the information to other subjects that they are taught in school.

In the 1980s, an integrated curricular approach was begun as an alternative, and is becoming more commonplace on a world-wide basis. For example, Malaysia integrated nutrition instruction in the primary schools (first six years of schooling) into subjects such as Man and His Environment, Islamic Studies, Moral Education and Music Education, where food and its basic functions are taught as well as the concept of a balanced diet. In Malaysia's secondary school curriculum, nutrition is incorporated into Physical and Health Education, where the relationship between nutrition, health, exercise, and concepts pertaining to overnutrition are taught (Karim, 1991). The Philippines has integrated nutrition into Health and Science as well as the core subjects in the "three R's," Arithmetic, Reading, and Writing (NNC, 1992). India evaluated the integration of nutrition education in health education and environmental sanitation during the third-fifth year of primary schooling. Results at the local school level indicated a significant change in height and weight indicators among children, and a marked decrease in observable deficiency symptoms, e.g. bleeding gums, after children received school instruction (Devadas, 1986).

One of the drawbacks of an integrated approach is that nutrition may be taught in a fragmented, uncoordinated, and uncomprehensive fashion. The net result may be less meaningful learning, comprehension and behaviour change than might be accomplished if nutrition were taught as a separate subject. Fragmentation can be avoided, however, if care is taken in curricula development to ensure that nutrition concepts are taught in a systematic, comprehensive approach where new knowledge is added to prior knowledge in a pre-planned sequence of steps and

learning objectives. This approach requires a co-ordinated effort across subjects, often involving teams of teachers and administrators.

Studies to evaluate the impact of nutrition education in schools are relatively rare. However, there is a general sense of disappointment with the results of classroom-based education. Less than optimal results may be due to a number of different factors, including too little time given to nutrition instruction, use of a non-participatory classroom approach, lack of family involvement especially at the primary level, or lack of self-assessment of eating patterns at a secondary level. School programmes that are not behaviourally-based and theory-driven are also less likely to be successful. Most important, however, are environmental supports (Lytle & Achterberg, 1995). Regardless of the quality of instruction, the learning will not be put into practice and behaviour change will not be accomplished unless the immediate environment supports such practices or changes.

Creating supportive environments

Offering food to school children is the most important immediate environmental support. School feeding programmes may be offered to school children as a stand-alone programme or they may be integrated with classroom instruction on nutrition. Supplementary feeding programmes are probably the most commonplace; the provision of meals, most often lunch and more rarely breakfast, is widespread in some countries. The purpose of supplementary feeding programmes is to supply school children with needed extra nutrients and/or calories, to improve their nutritional status, to improve school attendance, especially in poor rural areas, and to improve children's cognitive development and school performance. The purpose of meal programmes is to accomplish the above three objectives as well as develop the eating habits and skills needed for life-long, positive, healthful eating practices.

There are two principal problems with feeding supplements, such as "Incaparina" to children: (i) it is difficult for the schools or health sector to sustain financially unless there is continuous government support and the necessary infrastructure to manage the programme, especially in urban areas (Kachondham, Winichagoon & Tontisirin, 1992); and (ii) it is difficult to obtain at the individual level if children do not attend schools or health clinics. Moreover, even if the supplement is available on the market-place, it will not become a part of the regular diet because it is "foreign" to the everyday food habits of the local people.

Experience in Thailand indicates that supplementary feeding programmes work better if the food supplement is processed at the village level, rather than developed and processed centrally and/or distributed through the health infrastructure (Kachondham, Winichagoon & Tontisirin, 1992).

Meal-feeding programmes (as opposed to single food supplements) may be partially or completely subsidised by the government or local community. Meals are preferable from a learning perspective, because the children are eating foods they can recognise and obtain in their own homes and communities. The feeding situation can then be an extension of the classroom, in essence, a learning laboratory, where proper eating habits can be demonstrated and reinforced in practice. This combined approach of classroom instruction and feeding has been encouraged since the 1970s (UNESCO, 1989).

Another important way to build a supportive environment for the school curriculum in nutrition is to involve the parents. Children can take their learning home and share it with other household members, but it is important to engage these other family members in the learning experience as much as possible. Dialogue between the parents and the teachers, as well as their children, should be encouraged. Parents can also become involved in food production, especially in school gardens, as well as in the planning for, and preparation of school meals for children. This Teacher-Child-Parent approach has been well exemplified in the Philippines (Salvosa-Loyola, 1993) and Thailand (Smitasiri, et al., 1993).

Creating links between the school and the community

School programmes will have greater impact and be sustained longer if they are tied to community activities, programmes, and other private and non-governmental organisations. School gardens provide an excellent opportunity for community involvement, as access to water, land, material input (plants, seeds, tools, etc.), gardening experience, available labour and extension information are needed to start and sustain them.

Thailand exemplified how such community linkages can be developed with a school-based nutrition education programme. To encourage the use of the ivy gourd plant (a rich source of vitamin A) and school market gardens (which raised food for the children to eat as well as for school income), they solicited help from the extension service and experienced home gardeners to start local projects. They involved key officials including school administrators, agricultural officers and the district committee to judge ivy growing and garden competitions between schools and districts. Mobile dramas also travelled to schools in all participating districts and provided entertainment with education to reinforce the communication message. They also involved Buddhist monks who played a promotional and educational role in the project. Finally, the message was also incorporated into local festivals and holidays, including New Year's cards with an ivy gourd greeting (Smitasiri, et al., 1993). Together, these various activities involved a large number of community members and opinion leaders, strengthening both the school programme and the community in the process.

Another logical linkage can be made between schools and health monitoring programmes. Children's growth and immunisation can be readily monitored in schools. Partnerships between health workers and agencies can provide access to children and needed support to all participants. Other potentials include involvement in teacher training and medical doctor training programmes, where the schools invite students into their classrooms to learn as well as teach. Libraries can also provide important links between the school and the larger community. Many countries use Village Health Volunteers or Village Health Communicators to work in rural areas. Volunteers can be trained in, and work with schools to broadcast programmes, motivate audiences, and co-ordinate nutrition and other health-related messages to children and the broader community.

Implementing special or system wide promotions

Linkages that occur at the local level can be extended to district, regional or system-wide programmes as well, especially in the area of nutrition surveillance and child growth monitoring programmes, other Ministry of Health programmes, child care centres, women's development

programmes, home economics training for women's groups, or any programme that promotes home food production or home consumption. In fact, linkages should be systematically promoted at all levels, from local community administrators and extension workers to district committees, provincial government officials, and high level government officials. Such linkages should be used to frame and institute policy changes at each of these levels to assure that nutrition education and communication programmes, especially highly successful efforts, are sustained over time.

Facilitating policy development

There are many areas where government policy has an impact on nutritional status, food security, and nutrition education at national, regional, and local levels. Some of these areas include agriculture, including animal husbandry, crop production, fisheries, and forestry; health; environmental policy; women's development; population; urbanisation; international economics; and trade agreements policy. Education, advertising and consumer policies are discussed less often in terms of their interaction with nutrition, but are probably as important. Policy is inalienably a matter of politics. At the same time, the school system is charged with a custodial responsibility for children. It therefore seems that schools should also be involved in policy development to protect and sustain children's development. Food and nutrition policies are integral to that interest.

Some of the issues that schools might address in terms of setting local policy and/or affecting regional or national policy include food subsidies, dietary guidelines, food labelling, consumer access to information about processed food products and practices, regulation of food advertising and marketing practices, limitation of foods adverse to public health, particularly in public feeding programmes (such as school lunch), guidelines for public catering, quality requirements for food, household food security, promoting healthy diets and life-styles, preventing and managing infectious diseases, caring for the socio-economically deprived and nutritionally vulnerable, and assessing, analysing and monitoring nutrition-dependent situations.

It should be recognised that the strategies for poverty alleviation have changed significantly in the past decade or so. It is now accepted by experts in behaviour change and nutrition communication that people's participation is fundamental for any sustainable improvement in the welfare of the poor. Participation means local people organising to shape the terms of the social, political, and economic processes that affect them. In other words, the people create organised demands upon governments and agencies as well as private and commercial bodies to meet their needs using indigenous expertise and technologies. Participation also implies capacity building and the strengthening of local institutions (Haralambous, 1993). Naturally, agenda-setting and policy formation play an important role in this effort. Food and nutrition policy may be among the most important and most obvious to people at the local level and local schools may be a natural focal point for such organization and participation. However, in some countries, the style of government does not permit the type of citizen participation discussed here.

MASS MEDIA AND SOCIAL COMMUNICATION

Using mass media to increase awareness

The mass media were not used widely in nutrition communication until the 1970s. Before then, nutrition communication relied almost entirely on face-to-face instruction in health clinics (Lediard, 1991). Many early efforts using mass media in nutrition communication yielded disappointing results. This was often because the quality of many past programmes was inferior due to a lack of training or preparation, inadequate resources, or because it was used for inappropriate purposes. Media cannot, for example, cure poverty (Lediard, 1991). But, neither can media be relied upon to change behavioural patterns by itself.

Media-based nutrition education projects are now legion. Some have produced changes in behavioural practices, such as campaigns for oral rehydration salts in Egypt, the Honduras, Gambia, and Swaziland, but changes in nutritional status are rare (Hornik, 1985). It is now known that the best use of media, particularly for stand-alone media campaigns, is to build public awareness about a new issue, problem, or resolution.

One of the most powerful aspects of the media is its ability to set the public's agenda. That is, media shapes what people view as important in the world, and it identifies and defines concerns, issues and problems. This is another form of building awareness. The public, however, may not agree with the conclusions reached by the media about how to resolve these concerns (Severin & Tankard, 1988). Other forms of two-way communication may be needed to persuade the public to adopt a different behavioural approach, for example, to infant feeding.

Developing single message strategies

Today, the strategies used to develop mass media communications in nutrition are taken from social marketing literature. Several sources provide good descriptions of how to plan persuasive messages such as Andrian (1994), Rasmuson et al. (1988), and the US Department of Health and Human Services (1992). Generally, four questions are posed at the beginning stages. Who is the target audience or consumer for the communication? What is the product? What is the message? What are the channels of communication? Market research is used to answer these questions and the media messages and campaign are designed accordingly.

There are four elements involved in designing an effective single message (Hornik, 1992):

- good content - the message supports changes, beliefs or activities already present in the community;
- good message - the message is characterised by high technical quality;
- good channel use - the selected media has a broad reach and is accessible to the audience; and
- good audience knowledge - the message is relevant to, and well accepted by, the audience.

Some of the key points include creating messages that are clear, concise, credible, and easy to remember, all from the target audience's perspective. Above all, the messages need to

appeal to the target audience's perceived need for information. The most effective messages include a precise behaviour change recommendation, use a memorable slogan or theme, and are presented by a credible source in a positive, uplifting style that is not offensive to any member of the target audience (US Department of Health and Human Services, 1992). Finally, a focus on motivation, not just information, is needed. Of course, all media should be thoroughly pre-tested with members of the target audience, as described earlier in this chapter.

A variety of media may be used to communicate a single message, including bulletin boards, booklets, pamphlets, posters, radio and television messages, newspapers, community bill boards, and promotional give-aways to name just a few. Promotional give-aways are products that carry slogans or short messages including calendars, T-shirts, caps, vests, ball point pens and pencils, notepads, pins, and bags. Effective promotionals are items that are regularly used by the recipients, routinely reminding them and those with them, of the message.

Print messages should specifically avoid jargon and technical terms, abbreviations and acronyms, small type, and long words, sentences, and paragraphs. Text should be written in an active voice and use organising headers, bold print and "boxes" to highlight important points. Graphics should be immediately identifiable to the target audience, relevant to the subject matter, and kept as simple, but up-to-date, as possible.

Short (10-60 second) public service announcements, spots, or plugs on radio or television should also recommend a specific action, make a positive (not a negative or fearful) appeal to the audience in simple language with a memorable theme, music, visual, or character to deliver the message.

Even the best designed message needs to be repeated many times if it is to build general public awareness or accomplish any other outcomes. Any form of mass media has a limited effect when it is delivered only once or for a short period of time. The audience needs frequent exposure to the message, even if it is familiar, but especially when it is new or novel to them. The greater the reach, frequency, and duration of a mass media message, the greater the number of people who will be reached and the greater the likelihood that change will occur.

Using mass media as the centre piece for a multi-channel campaign

A fundamental dilemma in nutrition communication is that interpersonal communication may be more effective at promoting behaviour change, but its reach, and ultimate impact, is limited by the size of the audience (Gillespie, 1987). The mass media reach far more people in far less time. However, single messages are unlikely to change strongly held attitudes or behaviours. Therefore, the best approach to a nutrition communication/behaviour change programme is to employ several different forms of media in a co-ordinated multi-channel approach (See Table 1).

Mass media campaigns are defined as planned, large scale, multimedia efforts to communicate a single concept idea to a target population(s) in a prescribed amount of time (Wallack, 1981). Generally, mass media campaigns:

- Use all available channels of media

- Address a single problem or behaviour
- Communicate a single well-focused message
- Are specific and relevant to the target audience

Table 1: Some relative advantages and disadvantages of face-to-face and mass media approaches

	Advantages	**Disadvantages**
Face-to-face	• Interactive • Reliable • Provides social support • Allows for personalising • Allows for modelling • Appropriate sequencing easy • Follow-up easy	• Expensive • Penetration weak • May encourage dependency • May not be acceptable to many people
Mass media	• Cheap per contact • Large numbers reach • More acceptable for many people • May stimulate self initiated change • Potential for further development through modern technology	• Weak engagement of users • Unreliable • Dilution of content • Follow-up difficult

Adapted from the Australian National Health and Medical Research Council's Nutrition Education Report (1989)

The mass media do not ordinarily serve as a necessary or sufficient cause of behaviour change. Mass media campaigns may speed the rate of behaviour change, but rarely initiate it. They can also play a role in facilitating one or more steps in the behaviour change process. They work best, however, in synchrony with other intervention components. Strongly held attitudes and behaviours are probably best changed with a combination of interpersonal and media messages (Severin & Tankard, 1988). Several family members should be targeted by messages in order to facilitate a supportive home environment for the desired behavioural changes.

Different media have different effects on different people. Heavy users of the media react differently to media messages than light users. Heavy users (those who listen to or watch media for four or more hours a day) tend to rely on the media for information about their community and the larger society. Therefore, they believe the media more readily than people who do not rely on the media for news (Severin & Tankard, 1988). Some people are interested in certain topics (e.g. sports) and pay attention to any media that addresses their interests, but dismiss any messages that do not address their favourite subject. A multi-channel nutrition communication campaign that introduces new messages with star personalities drawn from these interest areas can take advantage of this. For example, in Brazil, the captain of Brazil's World Cup football team, a well-known male musical entertainer, and three well-known television actresses were used in 30-second television commercials to support breast-feeding (ad Kahn, 1991). Alternatively, nutrition messages can be incorporated into pre-existing heavily watched media

(e.g. "soap operas" or "novellas"). Other communication channels can then be used to reinforce these messages and stimulate behaviour change, especially at the local level. In Thailand, for example, Buddhist monks were very influential within communities, but mass media was useful for initiating community campaigns for change (Smitasiri et al., 1993).

Facilitating pro-active use of mass media

Several factors contribute to the potency of any media campaign. Media effects are limited when interpersonal relations and prior beliefs conflict with the message. Media effects can be powerful when they coincide with interpersonal relations. When the public hears a message that makes them uncomfortable, they may selectively pay no attention to it, misinterpret it, fall back on their own rationalisations, disbelieve it, or attack the source's credibility to reduce their discomfort with the message. However, discomfort with the message can be overcome if it offers sufficient rewards, including utility, novelty or entertainment values (Severin & Tankard, 1988). People will be less resistant to a new message if it is introduced by opinion leaders in the local community or general society. Only sound market research prior to message development can anticipate and accommodate the conflicts the target audience might have with the messages.

Because multi-channel media campaigns are by definition complex, partnerships are highly recommended to facilitate their development, implementation, and evaluation. Nutritionists need to form partnerships with social scientists and communication or media specialists. In addition, multi-sectoral partnerships are also routinely required. They may involve private industry, non-governmental agencies, government agencies, religious leaders, and grass-roots participation at the local level. Policy-makers should, in particular, be thought of as a target audience and be included in communication design. Desired changes are most likely to occur within a supportive environment for change. Only broadly based partnerships can create that context. Authoritarian-type governments may provide a better context for a co-ordinated, multi-sectoral communication programme than more democratic-type governments where communication industries are independent, commercially oriented, and owned by many different people.

In recent years, innovative mass communication approaches have been effectively integrated into mass media campaigns to create widespread attention, interest, motivation, and recall for particular nutrition, health and population messages. One approach has been called "*enter-educate*." It combines entertainment and education through songs and entertainment programmes featuring popular movie and television personalities. The enter-educate productions are aired over radio and television, featured in magazines and newspapers, and even through live shows in shopping malls. A similar approach, "*info-tainment*", combines the objectives of informing while entertaining the public via comedy and drama programmes over radio, television, and comics. Info-tainment has also been used by community development workers to reinforce their interpersonal approaches. Using mobile audio-visual vans, they present certain video documentaries on agricultural technology, alternating with a full length movie of the audience's choice. The advertising industry has also introduced "*values advertising*" and "*development plugs*" to inject messages with developmental value in their advertisements. Enter-educate, info-tainment and developmental plugs are unlikely to work effectively unless they are created by a team of nutrition educators and mass media specialists.

Inter-sectoral partnerships can accomplish two objectives. They may increase the broadcast of more positive nutrition messages, and thereby change the communication mix. They may also decrease the broadcast of negative messages as partners recognise the number and kind of negative messages already broadcast in the mass media. They may then voluntarily withdraw certain negative messages or work to change some of those messages.

Training media journalists

There is a shortage of media specialists in developing countries, especially those associated with ministries of health or education. In some cases, a ministry of agriculture may have access to communication expertise. Health ministries and education ministries should be encouraged to create positions for media specialists and include them in the earliest stages of programme development. They should also try to work inter-sectorally to support training for media specialists and create an infrastructure to support their activity.

Media journalists tend to be trained as generalists. Few have the expertise to correctly communicate health and nutrition information to the public. Therefore, multiple training programmes are necessary to promote effective nutrition communication campaigns:

- More media journalists need to be trained, with emphasis on the co-ordinated use of a wide variety of media for the purpose of mass media campaigns. This will require training on how to incorporate innovative technologies into programme planning as well as the use of traditional communication modalities.
- Continuing in-service training will always be needed to update media journalists on innovative technologies as well as nutrition and health information, because information and methodologies in both fields are changing rapidly.
- Health and nutrition professionals also need to be trained how to collaborate effectively with media journalists. This will require additional training in the behavioural and social sciences.

Training of media journalists and communication experts can be costly in itself, but the Union of National Radio and Television Organisations of Africa (URTNA) has developed an effective model that may be appropriate in many parts of the world. URTNA has 48 member countries that team together to sponsor training sessions and an exchange of programmes and teachers across international boundaries. In a three year period, they have graduated 120 technicians from their training programmes and have exchanged over 2,000 radio and 900 television programmes for broadcast. Regular meetings held every two weeks between communicators from national broadcast organisations and experts in family planning and maternal and child health are considered a key element in this programme's success. The meetings foster open communication between these two fields and stimulate teams in different countries to produce higher quality programmes (Demena, 1991).

Effective training programmes are needed, but are not sufficient, for the creation of successful communication programmes. Successful programmes require not only the incorporation of communication technologies, but also institutional infrastructure and a supportive policy and philosophy to sustain such communication efforts across a region or country.

WORK-SITE PROGRAMMES

Establishing the benefits to employers and employees

Healthy work-site programmes became popular in the 1980s and nutrition education is a common component of these interventions. They have been reported in telephone companies, police departments, Fortune 500 companies, and small local businesses. Healthy work-site programmes emphasise disease prevention or health promotion. They are based on the assumption that certain chronic diseases affect job performance and/or company profitability. For example, it is less costly to prevent hypertension via education than it is to treat it via medication. Some of these chronic diseases are related to food habits and choices. Since these food-related behaviours are not fixed, communication and other interventions designed to modify these behaviours may decrease the risk associated with these diseases, and presumably increase worker productivity, decrease company costs and improve the company's public image.

Work-site nutrition education programmes are appealing for many reasons. From the employer's perspective, they may increase workers' productivity, decrease absenteeism and turnover, improve recruitment of personnel, and generally improve company morale. From the health-care provider's perspective, work-site nutrition education programmes provide access to workers who may not otherwise be served by the health-care community, enable cost-effective and efficient screening opportunities, provide a forum where nutrition information can be efficiently disseminated, and an environment where behaviour can be monitored and social or peer influences can be used to reinforce behaviours. From the employees' perspective, work-site nutrition education programmes may be attractive because they are convenient, meaningful, credible, and ongoing. If successful, they can decrease health-care costs and improve the happiness, health, and quality of life for individual workers and their families (Johnson, et al., 1988; Ostby, 1989).

Screening and needs assessment

Groups of participants can be screened, counselled, and followed in a time-efficient and cost-efficient way (Johnson, et al., 1988). These screening data should be used to design appropriate interventions and communication campaigns for the company as a whole and possibly, for individuals within the company. Baseline data should be collected about the individual workers, their home and community environment, and their employers and work environment before a work-site programme is designed and implemented.

Screening and needs assessment of individuals may assess anthropometric variables (such as height and weight), demographic variables (such as age, sex, and marital status), biochemical indices (such as hematocrit or serum cholesterol), clinical variables (such as blood pressure), dietary variables (using a shortened dietary history, 24 hour food recall, or food frequency questionnaire), physical activity (including type of work performed), lifestyle characteristics (such as smoking, alcohol consumption, time spent at or away from home), nutrition knowledge, attitudes, and beliefs, interest in nutrition programmes, use of medical and social services, and a brief medical history (Alford, 1986; Kris-Etherton & Engelland, 1986).

Assessment of the work-site should include management style (e.g. autocratic vs. participatory or production-oriented vs. people-oriented), nutrition-related policy at the work-site (e.g. time allowed to eat), eating facilities, food storage facilities (including places where women can breast-feed and store breast milk if necessary), hygienic facilities (e.g. washrooms), hours of work and individual control over work time, seasonality of employment, job satisfaction of employees, relations between workers, shift work and company management, the company's long term objectives and goals, turn-over rate in employment, opportunities for social interaction on the job, and the norms, values, beliefs, and patterns of behaviour that guide daily functioning and interaction at the work-site (Johnson, et al., 1988). Some of these variables are important in order to determine how to introduce and sustain a work-site programme in the most acceptable manner to both workers and management.

Catering programmes, nutritional improvements of food services, and point of sale promotions

Many family members, including school children, spend a major part of their day in the workplace or in school. This means that they must eat at least one meal and about two snacks outside the home. This has led to the growth of the food service industry, particularly street-food vending in developing countries. The street-food trade is a source of livelihood for many people among the low income group, and is a source of cheap food for low to middle income people. Recognising the need to protect consumers against unhygienic and low quality street-foods, FAO supported pilot projects on the improvement of street-food safety and quality in several developing countries in Asia and Latin America. An education and communication component was built into the projects, addressing consumers on one hand, and educating street-food vendors on the other, on topics like basic nutrition, food preparation, hygiene, and sanitation. Seminars and training in the workplace had been successfully carried out for both groups, reinforced by well researched and properly designed print and audio-visual media such as posters, flyers, brochures, flipcharts, and training modules.

Work-site-based cafeteria interventions, in particular, have been one of the most popular work-site nutrition intervention strategies used (Glanz & Rogers, 1994). In these programmes, employers offer their workers choices of nutrient-dense foods (e.g. low calorie, low fat, high vitamin C, high vitamin A, or high calcium foods). These foods may or may not be offered along with other less desirable choices. Often nutrient information in the form of labels or posters accompanies the foods in the cafeteria environment. In companies that do not have cafeterias, employers may negotiate with vendors to ensure that point-of-purchase nutrition information and/or suitable choices are made available (American Dietetic Association, 1994). Entrepreneurial lunch wagons can offer nourishing food to field work-sites that are remote from feeding facilities. Facilities for washing before eating are also important. Some companies subsidise in-plant food services partially or totally, making them nutritious, attractive and convenient to employees. Some employers have also added nutrition awareness games and incentive raffles (e.g. free lunch) to employees to encourage their participation in these programmes (Mayer et al., 1987). Research studies have generally produced positive trends in dietary intake but often only outcomes over a short period of time are evaluated. Most of the catering programmes reported in the literature have concentrated on heart health issues, but other

issues that could be considered include use of fluoridated water, iodised salt, adequate protein, clean water, and iron.

Nutrition education as a stand-alone work-site programme

Nutrition education that is not connected to any other form of health education at the work-site can be described as a stand-alone programme. Stand-alone programmes may include formal classes and programmes, newsletters, memos, payroll stuffers, posters, bulletin boards and electronic mail (e-mail) (Kris-Etherton & Farquhar, 1994), as well as informal discussion groups, buddy systems, and other support groups. Carefully targeted materials and classes can have a significant impact on nutritional status, not only for employees, but for their family members as well.

The success of stand-alone programmes depends on how supportive the company environment is of the recommendations. Stand-alone programmes are unlikely to work if they include only information dissemination. Generally, work-site nutrition education programmes require supportive environments (such as cafeteria or food catering programmes as described above). It is essential that employees have access to appropriate food choices. Release time from work and employer commitment to the programme are also viewed as important to success. Employees respond best to healthy work-site programmes that are simple, practical, and relevant and that allow them to participate actively in the learning activity during work time. Eating pattern messages which include specific foods or brand names and behaviourally oriented programmes are better accepted than messages containing medical jargon and lengthy background explanations (McCarthy et al., 1992).

Nutrition education as part of an integrated health programme

Nutrition education can also be integrated into a more comprehensive health programme at the work-site that might include, for example, smoking cessation programmes, drug and alcohol education, stress management, child-care education, and breast-feeding support. It may be combined with an exercise or fitness programme or more often, a weight control programme. Nutrition education may also be integrated into the health benefits and/or health insurance offered by the employer to workers, especially in companies with Health Maintenance Organisations.

Work-site nutrition education programmes can also be integrated into the broader community. Community-based wellness councils, for example, team non-profit health organisations with small businesses and vendors within and across communities. The councils do not compete. Rather, they bring together local providers with common interests to share ideas and resources to offer healthy work-site programmes that they cannot afford themselves. Often they share newsletters and strategies with one another. Wellness councils may publish "how to" guides, hold delegate meetings and annual meetings, or share the cost of bringing in an outside consultant or nationally known speaker (Kizer, 1987). Ideally, community-based wellness councils match local expertise to local needs and help small businesses lever their limited resources for maximal impact. Together, they may also affect an entire community to create a more healthful and supportive environment for its citizens.

Number of work-site programmes

Given the advantages of, and opportunities for work-site nutrition education programmes, it is interesting to note their small number, especially in developing countries. This may, in part, be due to the lack of an infrastructure for these programmes, but there are several other considerations as well. Work-site programmes have been criticised because many tend to serve only healthy workers or well-paid, professional employees, neglecting those in greatest need. They may increase personnel costs to the company, at least initially, and they may subject a company to liability concerns (Ostby, 1987). The most common criticism, however, is the lack of data indicating the relationship between quality and quantity of work performed by workers and their nutritional status (Kris-Etherton & Farquhar, 1994), and/or the economic savings realised by the company with such programmes (Ostby, 1987). It should be noted, however, that many of the evaluations are short-term and flawed by their research designs and/or analysis (Conrad, Conrad & Walcott-McQuigg, 1991). Relatively little attention has been given to developing methods for institutional commitment, and this seems critical to programme success.

CONCLUSIONS

This review has led us to draw four broad conclusions: (i) nutrition education and communication should be thought of as an integral part of a country's development plan; (ii) changing food and nutrition behaviours to improve nutritional status at a country level is a long process comprising many steps, in many sectors, at many levels; (iii) nutrition education and communication programmes need to be comprehensive and co-ordinated for effectiveness; and (iv) nutrition education and communication problems need to be participatory in nature for effectiveness. These conclusions are further developed below.

Nutrition education and communication should be thought of as an integral part of a country's development plan.

The nutritional status of a country's population is an important indicator of national development. The causes of poor food habits are complex. The simple provision of food or supplements does little to resolve long-term nutritional problems. Nutrition education and communication can have a significant impact on a population when there is political stability, social coherence, and a favourable economic climate. Nutrition education and communication provide people with the knowledge, know-how, motivation, and reinforcement to empower them to effectively address their own long-term food and nutrition problems.

Changing food and nutrition behaviours to improve nutritional status at a country level is a long process comprising many steps in many sectors at many levels.

Recognition of this fact may call for a reorientation in thinking about nutrition programmes. A long-term, holistic view of nutrition education and communication is needed, with nutrition education seen as a central component, not merely as a tool to use on occasion. This holistic view may also require a re-examination of the philosophy, processes, strategies, messages, and methodologies used in nutrition interventions. It involves many actors including policy makers, planners at community and national levels, educators and communicators, NGOs

and other providers of resources, field support staff and service delivery personnel, community leaders, and finally, mothers, children, and other family members.

Nutrition education and communication programmes need to be comprehensive and co-ordinated for effectiveness.

Mass media messages, although cosmetically perfect, will be ineffective as stand-alone interventions. Rather, several communication channels should be used. At least some of these channels should involve two-way communication. These activities require an administrative infrastructure, including organisational structure and managerial mechanisms to support a co-ordinated effort. Usually these efforts will have to be multi-sectoral in nature. Commitment to the programme effort at all levels is needed for sustained programmes.

Nutrition education and communication programmes need to be participatory in order to effective.

Interventions should be problem-solving, decision-making and action-oriented. Ideally, the target audience should feel a sense of ownership of the programmes. Therefore regular interpersonal communication is needed with at least some representatives in all development, implementation, and evaluation procedures.

RECOMMENDATIONS

The conclusions lead to four specific recommendations:

(i) The commitment of political leaders, policy makers, and resource providers should be sought as an initial step to programme planning and launching of the implementation strategy.

(ii) A "two-way" flow of information and resources should be emphasised in all nutrition and communication programmes.

(iii) More and better quality training programmes are recommended.

(iv) Nutrition communication and education efforts should effectively combine the processes and approaches of social marketing, social mobilisation, and development support communication.

These recommendations are described in further detail below.

The commitment of political leaders, policy makers and resource providers should be sought as an initial step to programme planning and launching of the implementation strategy.

Communication programmes often lack the budget, the staff, and the resources needed for an effective and sustained public education programme (FAO/WHO, 1992). Advocacy efforts can help to enlighten policy-makers and resource-providers about the importance and

effectiveness of nutrition communication in influencing behaviour changes to improve nutritional well-being. Continuous support and commitment is essential to success.

A two-way flow of information and resources should be emphasised in all nutrition and communication programmes.

A two-way flow implies the effective use of both top-down and bottom-up (as well as lateral) communication. It assumes that programme or project formulation begins with the target groups and it uses consultation, co-ordination, collaboration, and co-operation in feedback, information-sharing and decision-making. As a result of the public's participation in the process, they should be able to decentralise the provision of services and institutionalise policy for communication and behaviour change in their own community development strategy.

More and better quality training programmes are recommended.

Training should not be a mere one-off effort. Rather, continuous in-service training is needed in order to respond to changing priorities and problems, to share relevant experiences or lessons learned, and to develop educational and communication technology. Training in programme management should also be included in education and communication technology. A train-the-trainer approach could be used within country or across national boundaries. The first level of training, then, would be the training of more trainers. The second level should be training of field support staff, community workers, teachers, and curriculum developers. The third level should be the training of specific target groups such as women or school children.

Nutrition communication and education efforts should effectively combine the processes and approaches of social marketing, social mobilisation, and development support communication.

No single approach will be continuously effective or suitable to the resolution of all problems, but each of these approaches has proven effective for certain problems at certain stages of behaviour change and development. Programme planners should be adept at all these strategies and employ each wherever it is suitable, again in a comprehensive and co-ordinated manner. Other theories and approaches to behaviour change should also be explored.

In conclusion, development should concern everyone. Nutrition improvement is a basic requisite to development. Concerted efforts in nutrition education and communication may facilitate its realisation, providing sufficient resources are available. Yet, co-ordinated action on all the causes and effects of under-nutrition must be taken as well. Issues involving over-nutrition may not yield as readily to mass communication campaigns.

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Training Needs for Nutrition Education: Guidelines for In-Service Training of Nutrition Educators

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INTRODUCTION

Effective and affordable delivery of nutrition education depends on sound training so that knowledge and skills for behaviour change can be communicated to a target audience.

This contribution provides suggestions to guide the instructor who trains nutrition educators on planning and implementing in-service training that does this. Nutrition education is based on the sound application of knowledge derived from the food and nutrition sciences about the relationships between diet and health (Anderson, 1994). The use of educators with training in nutrition allows efficient use of human resources. Such individuals have a science base that encompasses both food and nutritional science upon which they can draw in crafting educational messages.

First we discuss some general issues that must be considered when embarking on nutrition education projects, including: who should be trainers and who should be nutrition educators? We discuss requirements for instruction of the instructors who provide in-service efforts to nutrition educators. We also review what communication skills nutrition educators need to encourage healthful diet-related behaviour changes. We address some other considerations, such as which causes of malnutrition can be remedied by nutrition education interventions. Finally, the institutional arrangements and resources for nutrition education are examined.

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Recommendations especially relevant for nutrition education in developing countries follow the Conclusions section. A glossary gives definitions of terms referred to in the paper.

BACKGROUND

Information delivery must include application of findings from studies of behaviour change. It is evident that "facts about nutrition do not change behaviour unless they have some meaning for the individual and relate to his needs" (Ullrich, 1972). Many factors influence the success of effective in-service training. It is essential to assess the setting of each nutrition education effort, and to incorporate local considerations in planning and after the early stages of implementation. Instruction coupled to opportunities for practical demonstration and observation help to reach trainees regardless of their learning styles. Incorporating outcome-based evaluation at all stages helps ensure efforts to produce competent and effective nutrition educators.

Before launching a nutrition education effort, it is important to consider what such in-service training is expected to achieve, and what kinds of people will be the most effective trainers and nutrition educators to reach goals in the particular setting. We use the term "trainer" to refer to those who train "nutrition educators" (trainees). "Nutrition educators" are those who conduct nutrition education programmes for target audiences, in communities.

Nutrition educators vs. nutrition trainers, and nutrition education vs. nutrition "training" sessions

Effective nutrition education of the public starts with core, or pre-service, education and training to establish basic competence in both nutrition and education. However, core training may take a long time to establish and implement. Another means of promoting effective nutrition education is to provide appropriate in-service training for nutrition educators who are already trained, but whose education lacks some needed background or skills. Even those who are superbly trained need refreshers, and competency must be periodically renewed since nutrition science and communication are constantly evolving.

Nutrition educators are expected to be able to respond to situations or challenges with a body of knowledge and experience, and not to simply perform rote teaching tasks. Therefore it is inappropriate to refer to them as nutrition "trainers"; the terms nutrition educator or instructor are preferable. Nutrition educators must provide both skills and up to date scientific knowledge to foster meaningful engagement and training. But they also must include efforts on the part of the trainer to ensure that those trained are personally involved and interested in learning. Lewis et al. (1988) found that teachers' experience and commitment to nutrition education influenced whether or not teenagers made positive changes in food consumption patterns. Attention to motivation, interactive learning activities and encouragement assisted in this process.

Goals of in-service training

The goal of in-service training is to equip the learners (nutrition educators) with the knowledge and skills they need to teach methods for changing diet-related habits that will ultimately improve the nutritional status of the target group. Learners may include nutrition

education professionals, paraprofessionals, volunteers, teachers, community members or agricultural workers.

In-service training must provide trainees, who will be educators in the future, with the skills they need to perform needs assessments, to collect and consider information germane to the problem being addressed, and to plan and implement their efforts accordingly. In-service training is best accomplished when specific learning objectives are identified on the basis of findings of a needs assessment, a specific population is targeted, and appropriate expertise is available to teach the teachers. Geographic, population, economic, and agricultural differences both among and between countries influence both the specific goals and objectives of these efforts, and the methods employed.

The types of nutrition education in-service training include public health efforts involving entire communities or specific sub-groups, research studies, and continuing education with no specific end in mind.

Who should instruct the trainers and nutrition educators themselves?

Among the many areas of overlap in the content of training for trainers and nutrition educators are communication skills, behaviourally-oriented techniques, and principles of adult learning. Needs assessment is essential to discover what learners need, rather than relying solely on what instructors are predisposed to teach. Traditionally training has been done by health care professionals who vary greatly in both their knowledge of the educational process and in their understanding of food and nutrition knowledge, even though they may be knowledgeable about human health. When educators are the trainers, content in food and nutrition sciences may be slighted and there may be an over-emphasis on communication skills. Training efforts which focus solely on teaching nutrition science or food science to nutrition educators fall short if they fail to include communication skills, and leave the trainee ill-equipped to fulfil the mission of teaching nutrition both for knowledge acquisition and behaviour change. Trainers should have a strong background in nutrition science as well as skills in communication and education.

To ensure that communication is adequate, those who instruct trainers and nutrition educators must have the skills necessary to communicate and to teach appropriate subject matter, in addition to being competent in their fields. They must be able to establish clearly the purpose, goals, and objectives of the training session, and have the skills to design and implement effective in-service programmes. Instruction of trainers must explicitly address the competencies that are expected to be developed at the end of the training programme. Instructors' subject matter expertise varies, depending on the specifics of application. Instructors must also have expertise in teaching skills, and their preparation should include attention to this. Appropriately prepared individuals may not exist in some countries. Under such circumstances it may be a necessary first step to develop the skills of a group of trainers who can in turn provide training for nutrition educators.

In developing countries, where pre-service training in nutrition is scarce or limited to a clinical rather than either a communication or a public health orientation, instructors may need expertise in prevention, education and communication as it relates to nutrition so that training sessions can provide skills in these areas. In addition to food or nutrition science expertise and

substantive knowledge, professionals who can teach skills in areas such as information technology, use of mass media, communications, conflict resolution, and behaviour, may be useful as contributing faculty for planning and implementing training sessions for nutrition educators.

Who should the nutrition educators be?

The nutrition educator is the individual who interacts directly with the target group. Diverse aspects of character and role model attributes influence the nutrition education's effectiveness and so they must be carefully selected. The audience must be willing to listen to and be influenced by the instructor.

Some general traits to consider when choosing nutrition educators include the ability to share or to understand cultural and religious beliefs of the target population that influence food habits, and to shape communication messages to accommodate these. The educator must have credibility with the audience. Familiarity often seems to be an advantage. Needs assessments reveal a partiality to local and familiar persons rather than experts for imparting nutrition education. For example, Doyle and Feldman (1994) found that 322 Brazilian high school teachers were perceived by their students as more effective than outside nutrition experts. Sometimes role models are needed. For example, mothers who have raised children successfully are more acceptable for teaching young mothers about child feeding than are single women, who may be perceived as lacking such experience.

The Pawtucket Heart Health Study is a large community intervention in the United States which made extensive and successful use of volunteers from the target audience, even in complex roles (Lasater et al., 1988). The volunteers established access and credibility within organisations, groups and social networks made them valuable both as messengers to members of the target population, and as role models who were in the target population themselves. Communities may also be able to take advantage of the influence of people already in positions to influence people's food choices. Built-in familiarity and pre-existing dynamics possessed by community leaders, members of social organisations, food service providers, day care workers, medical journalists, village volunteers and religious leaders, make them good candidates for being trained to participate in nutrition education efforts both as volunteers or for pay.

The social value of drawing role models from the community is that much can be taught by them that would not be accepted when using non-community members. Such individuals may also provide instructors with insights on how teaching processes and content can best be adapted to local circumstances. Some recent efforts that capitalise on existing relationships and local human resources, include training adult peer educators (Lynde, 1992; Golden, 1991), village health volunteers in countries such as Thailand, community volunteers (Linnan et al., 1990) and use of community workers in Co-operative Extension nutrition programmes in the United States (Randell et al., 1989).

A successful model for appropriate use of volunteer counsellors to alleviate the demand for more extensively trained mental health professionals is described by Golden and may provide assistance for dealing with these issues (1991). Supervision, evaluation and ongoing training help

ensure that helpers are working appropriately with the population as determined by the programme.

In developing countries, health providers may have relatively little formal training, but they can still be effective in outreach efforts to convey simple nutrition and health messages in an acceptable manner (Zeichner, 1988; Harvey, 1988; Engle, 1991).

TRAINING TRAINERS AND NUTRITION EDUCATORS

This section provides a guide to in-service instruction of both trainers and the nutrition educators that they train. There are commonalties in the knowledge, skills, and behaviours required of these two groups of professionals, and therefore instruction is considered for both groups together. The section on Other Considerations below includes specific requirements for the training of nutrition educators which are not addressed in this section.

Assess what trainers and nutrition educators need to know

Both trainers and nutrition educators must master certain basic knowledge and skills. The basics vary depending on the trainees' background and their proposed role. The person who is responsible for training them must find out what they know and fill the gaps with instruction that will make them effective trainers and effective nutrition educators.

Plan on the basis of a needs assessment and actualise goals and objectives

The planning stage must include all aspects of the training cycle: the needs assessment of the audience and the endeavour, developing clear, measurable goals and objectives consistent with the desired approach, strategies for implementation and development of the training curriculum and teaching methodologies, and delivering and evaluating the training (Pont, 1991). Making a complete list of tasks with information about what the worker will do, how the worker does it, to whom or to what, and why, will help determine what needs to be done in terms of specific skills, knowledge and attitudes required to perform the job (Goldstein, 1986). Assessment also makes it possible to specify the objectives of the training, which in turn drive the design of the programme and establish measurement points for evaluation. Initially determining the purpose of the education effort "tells where to begin, and specification of objectives tells the completion point of the programme" (Goldstein, 1986).

In addition to clearly defined tasks, objective points for evaluation at the beginning of an education effort, and consultation with members of the groups to be reached during this stage, will help to ensure a realistic plan. Focus groups or qualitative assessment efforts which involve meeting with target group members may be in order, or selected members of the population can be officially involved in the planning stage on a programme committee.

For nutrition educators, understanding of the primary audience is key for identification of those who influence the primary audience, such as health and nutrition care providers, families and friends, popular public figures, and for what "gatekeepers" - who are still further removed from them, such as decision makers, health organisations, financial supports and other influential people - can do to help (Parlato, Green, Fishman, 1992; Ngo, 1993). All these different groups

must be considered, and plans made to reach them will help to ensure reinforcement of messages to the primary audience from sources other than the nutrition educator. Trainers must keep in mind the importance of cultural identification and how best to incorporate cultural beliefs and traditions in planning and teaching while preparing nutrition educators.

Establish clear, measurable goals and objectives

Goals

A goal expresses a value in terms of an ideal future reality. Formulating goals forces one to think about desired ends and to anticipate the future over the long- rather than short-term. Goals are broad, general statements and as such they can neither be measured nor be fully expressed by any one statement. Goals are intentions to act that have meaning, specifically within the context of the effort at hand. The goals of a training programme for trainers of nutrition educators may be narrowly focused on the outcome behaviours or qualifications of the trainees. However, goals should be constructed keeping in mind how the ultimate outcomes affect institutions, organisations, or the larger community. An example of a nutrition education goal might be to increase the abilities and improve behaviours of pregnant women to select high protein foods during their pregnancies, which would decrease low birth weight, especially among teenage mothers.

Objectives

Goals must be concretely expressed through a statement of objectives. As measurable expressions of desired results, objectives provide the basis for evaluation. An example of how goals and very specific objectives may be integrated is in the Year 2000 goals of the USDHHS of the United States (USDHHS, 1990). The formulation of objectives should incorporate four characteristics: a measurable condition, a finite population, the amount of change desired (expressed as an absolute number or as a percentage), and a time period over which the plan will operate, at the end of which the results will be measured. Objectives should ideally reflect the "end" of the planning efforts, rather than the "means", that is, they should refer back to the larger goal. One example of an objective derived from the sample goal given above might be: after one complete 2.5 year cycle of training nutrition educators and the dissemination of education materials and interactions throughout the communities of interest, the protein consumption of pregnant women between the ages of 18 and 38 should have increased by 10%, to meet between 80-100% of the dietary standard for pregnant women.

Behavioural objectives

Behavioural objectives for the outcomes of in-service training must be realistic and obtainable. Nutrition educators must include as many as possible, of the many factors that influence nutritional status and dietary habits in the planning of goals and objectives. Also, objectives must be limited to those that can be addressed within the framework of the nutrition education effort. Pilot studies to determine if goals and timetables are realistic may be helpful. Time is usually limited for various reasons including funding, availability of trainers and trainees, and changing environment. However, trainees must understand that producing the desired results

- sustained behaviour change - takes a considerable effort over a long time to learn, to implement and to measure. If nutrition education campaigns are institutionalised and fit into larger objectives they may receive more support.

It is important to spend the most resources in terms of time and money on the most important things. For example, spending a disproportionate amount of money on evaluation may produce an excellent evaluation tool but a sub-standard education effort as a result of the limited resources allotted.

Competency-based objectives

"Competency-based" refers to objectives that are geared to trainees attaining competence; this is accomplished by including tasks that can be carried out and evaluated during the process of training, that demonstrate the required knowledge and skills. Competency-based objectives should be established on each specific component of trainees' future tasks and stated explicitly in planning training and during its implementation. They should be evaluated to ensure that trainees are adequately prepared. For the above example, a competency-based objective would be: "educators are able to estimate the protein needs of a sample young pregnant Spanish-speaking woman who is poor (representative of the population of interest), and formulate a culturally, financially and otherwise appropriate dietary plan to meet these needs".

Manage for continuous feedback

Managing a nutrition education effort requires continuous feedback so that corrections can be made quickly. Responsibilities of all participants, trainers and nutrition educators alike, must be clearly stated initially, accountability stressed, and adherence to plans monitored. Records should be kept by all participants for quality assurance and feedback as well as for assessing ultimate effectiveness. Programme information and communication systems should be decided upon early in the project. They are especially critical if management is not centralised and in programmes covering large geographic areas.

Centralised vs. local

Both centralised and local management in large scale efforts have advantages. Central management should assure consistent messages, training procedures, materials, etc. Community management inputs are valuable for making sure that "messages are culturally appropriate, actionable and that they reach their intended audience" (Parlato, Green & Fishman, 1992).

Resource allocations

Resources are allocated in the planning stages of the project. However, good management of implementation includes monitoring of expenditures and reallocations, as there will inevitably be additional demands for resources. Occasionally adjustments may be needed. These allocations must be considered carefully in relation to pre-planned components, the benefits to goals and objectives, and other anticipated needs.

Develop training manuals and teaching resources

The educational and cultural background of the target audience must be considered when developing teaching materials and resources. Reading levels, quantitative and numerical ability, and preferred styles of presentation of learning materials should be considered. All trainees will benefit from clearly stated directions. Active rather than passive learning techniques include demonstrations, supervised practice, and use of a variety of media including slides and videotapes, which help trainees observe, absorb, process, and demonstrate the knowledge and skills being taught.

Build flexibility into development of complete training manuals and resources

Training manuals should include specific materials needed for the future training sessions of nutrition educators. They might include outlines of the training sessions with appropriate and specific objectives, basic information to be taught to participants, learning activities (role plays, case studies and field work), supplementary articles or information, a bibliography of reference materials, and handouts and worksheets which can be reproduced (Armstrong, 1992). It is wise to allow for flexibility in the organization of manuals and teaching materials, so that feedback from the trainees can be incorporated into beneficial changes. Teaching resources should enrich and expand upon materials in the training manuals.

Implement training programmes for the adult learner

Consider the special characteristics of adult learners to motivate and encourage them

Trainee characteristics that are important in planning in-service training includes trainees' readiness to learn, their learning potential, interests and past experiences, as well as their information and knowledge base, and their competence levels with respect to required skills. Their degree of independence (e.g. their willingness and freedom to apply what they have learned) must also be established (Rinke, 1986). Like all adult learners, trainees benefit when they see how their past experiences and capabilities can be employed in learning. In-service instruction of trainers should include a discussion of adult learning principles and examples of their application in the training sessions themselves. Table 1 presents Grabowski's (1976) list of competencies of adult educators that are relevant for training of both the trainer and nutrition educators.

Use instructional methods that are suitable in content and cater to adult learners' preferences

A person who has command of information does not necessarily have a grasp of effective methods of communication and information delivery. Teaching is a skill that is essential for implementing adult learning. This not only considers the learning styles of the audience, but the way information is packaged to teach the learner. Certain material lends itself better to some communication methods than others. For example, it is very difficult to teach cooking methods by instruction alone - demonstrations are critical. The most effective methods also vary depending on the characteristics of individual learners, and their favourite or most comfortable learning styles. Some adults respond best to facts, others to "hands-on" experimentation, and

still others find ways of manipulating the information to fit their understanding of how it may be most helpful (Holli & Calabrese, 1991). Since no one style is favoured by everyone, it is best to present the material using a variety of methods to accommodate individual variation in learning styles, as well as in the type of material to be taught. Integration of didactic learning and "hands-on" practical experiences for skill development usually enhances learning best, regardless of prior training.

According to an extensive literature review of nutrition education efforts in the United States, behaviourally oriented methods of nutrition education are more likely to be effective in bringing about changes than didactic approaches. Including methods of behavioural modification in training sessions, however, requires competent educators and more time for reinforcement of the necessary skills, both of which make inputs for these approaches more costly.

Table 1: Characteristics of a competent adult educator

...understands and takes into account the motivation and participation patterns of adult learners.
...understands and provides for the needs of adult learners.
...is versed in the theory and practice of adult learners.
...knows the community and its needs.
...knows how to use various methods and techniques of instruction.
...possesses communication and listening skills.
...knows how to locate and use educational materials.
...has an open mind and allows adults to pursue their own interests.
...continues his or her own education.
...is able to evaluate and appraise a programme.

Base training on sound theory

The theoretical basis for planning interventions for changing health behaviours rests on models of behaviour. The most common theories mentioned in the nutrition education literature are summarised in Table 2. Glanz and Rudd (1993) surveyed nutrition education and consumer behaviour professionals (both in fields providing information to influence food choice) for their opinions on which theories and models were most familiar and useful. Those in both fields selected a few familiar and current theories, but respondents concurred that theories were not all-important as there are frequently gaps between research and practice.

The practical application of these theories is difficult since no single model of behaviour change available today fits all situations. While theories attempt to identify all factors which may

influence the outcome behaviour, they are simplifications of reality. Also, different theories are more successfully applied at one stage of learning than at another. Therefore, it is difficult to use a single paradigm for the whole intervention process. Nevertheless, theory-based nutrition education efforts and the use of theoretical models to help construct training efforts are useful since they permit the educator to methodically incorporate the influence of motivators, barriers, and other influential factors in the planning and implementation of nutrition education efforts. Eclectic models may be most appropriate.

Table 2: Frequently used theoretical approaches in nutrition education

THEORY	COMMENTS
Social Learning Theory Behaviour change is mediated through cognitive processes (i.e. thinking, perceiving, believing) Cognitions (attitudes and beliefs) about a behaviour are altered most easily through actual performance or observed performance of the behaviour. Influences (components) include the environment, providing incentives and disincentives; situations which provide consequences, or "expectancies"; and skills (behavioural capacity), and self-efficacy, (the ability to do what needs to be done). Positive reinforcement is important for this component) (Bandura, 1986).	Represents interaction and influence of factors in the social environment as they reflect and modify behaviour.
Stages of Change/Translocation Theory Emphasises construction of different messages to people who are at different stages of readiness to change a certain behaviour. The stages of readiness include pre-contemplation through contemplation and eventual action. For more complex applications, the transtheoretical (across several theories) model posits relationships among the stages and processes of change (Prochaska, 1990).	Attitudes and attitudinal assessment of target audience are emphasised.
Health Belief Model Weights various factors influencing health behaviour change. People more likely to change are thought to be the ones who believe they are susceptible to a stated risk which has potentially serious consequences, when the solution offered is likely to decrease the susceptibility or severity of outcome, and the anticipated costs or barriers to participation are outweighed by this benefit. Further, those with high self-efficacy, such that they feel they can do what needs to be done to improve the situation, are most likely to change (Rosenstock 1988).	Does not reach those who are at risk but do not see themselves as such, due to denial or lack of information. Does not include non-health-related reasons for behaviour (i.e. weight loss for aesthetic reasons). The focus on individual determinants can lead to victim-blaming.

Social Action Theory	
Based on the information processing theory, people are assumed to choose the alternatives which provide them with the most "good" outcomes and the fewest "undesirable" outcomes. Examines people's intentions to behave a certain way and assigns a probability of certain actions based on intentions, influence of others, etc. (Azjen and Fishbein 1987).	Useful for explaining food-related behaviours over which people have control. Acknowledges the real world in that it considers social influences on certain behaviours. The more options that are identified along the continuum from intention to desired outcome, the better the predictive value of the model.

Follow a four step approach: model; guide practice; provide feedback and support

The four basic steps for optimal training of nutrition educators are based on sound theoretical considerations and empirical research (McAlister et al., 1976). First the instructor models or demonstrates new responses and action patterns. Second, guided, and increasingly independent practice in those thoughts and behaviours is provided. Feedback on the appropriateness and accuracy of responses is provided. Finally, trainee behaviours are reinforced by support and encouragement. Gradually the new habit or skill may have naturally reinforcing consequences which provide further rewards.

Develop motivational techniques to market messages

Without motivation to act on a specific message, information is useless. The educator must find out what factors motivate people to change their health behaviours, provide information that will motivate them, and deliver it in a context which promotes change. Training that motivates and reinforces the confidence of the nutrition educator, as well as training that includes techniques which improve these skills in counselling is helpful (Parlato, Green, Fishman, 1992).

Some questions answered through qualitative investigative techniques which contribute to developing motivational approaches and messages are listed in Table 3. Qualitative methods such as focus groups and surveys help to provide data needed to develop motivational techniques to personalise the audience assessment. Lopez (1993) used focus groups with low-income women to determine, develop and instrument measuring the effects of certain psychosocial influences on eating in this population.

Table 3: Questions potentially answered through focus groups and surveys of target groups

What motivates and reinforces the health behaviour in question?
What are the barriers (negative motivators) to improved health behaviour?
Who considers themselves at risk?
How aware of the consequences of the behaviour are members of the population?
How deterred by consequences are they?

Select appropriate methods of education and communication for target groups

Effective education and communication techniques that are derived from marketing and the behavioural sciences are often appropriate and effective for changing nutrition-related behaviours at the community level (Parlato, Green, Fishman, 1992; Cabanero-Verzosa, 1991; UNICEF, 1990). This is called social marketing. Nutrition communication has been most effective when several steps are taken (Parlato, Green, Fishman, 1992). First, a limited number of specific behaviours significantly affecting the target group's nutritional status are selected. Second, small behaviour changes that provide a viable choice within the time and cost constraints of the household and community are targeted. Third, messages tailored for each of the groups of people that influence the intended beneficiary are employed using communicators and language that are meaningful to each group. These messages must be conveyed with enough salience and for a long enough time that the ideas enter into "normal" conversations in the target group and are eventually adopted as behaviours. Finally community involvement in message development and pretesting is also helpful.

Social marketing seems to be an effective communication technique, regardless of the information one is conveying, since it emphasises getting the message to the consumer rather than to the communicator. Social marketing emphasises that members of the target audience are consumers, or clients rather than inferior beings to be enlightened (Parlato, Green & Fishman, 1992). In this case, the consumers are both the nutrition educators (as trainees), and the target population. When applied to nutrition education, using the social marketing perspective requires that trainers prepare nutrition educators who are particularly knowledgeable about their audience and involve them in finding solutions to problems of inadequate nutritional practices. Nutrition educators should be able to: understand the client's circumstances and why current opinions and feeding practices are prevalent; seek practical solutions to nutritional problems in collaboration with the consumer, based on the resources available to the family; and, systematically follow-up and sensitise the community to the problem. Supervised practice in the use of these techniques is also helpful.

Familiarise nutrition educators with the use of social marketing techniques in crafting programmes

Social marketing refers to a process of delivering highly appealing audience-specific messages. It draws on insights from marketing and advertising. It requires finding out what people need and want, and then developing a programme based on those appeals (Novelli, 1990; Ngo, 1993).

The objectives of social marketing include disseminating new data and information on healthy eating practices to individuals, offsetting the negative effects of a practice or promotional effort by another organization or group, and motivating people to move from intention to action in implementing sound dietary practices. Social marketing incorporates the influence of the audience's motivators and reinforcers into planning nutrition education campaigns. Not all steps involved in planning a social marketing programme involve nutrition education. However each step helps define the appropriate nutrition information and best choices of communication to use to reach goals (Young, 1988).

Steps for planning a social marketing campaign are listed in Table 4 (Ngo, 1993). Trainers of nutrition educators should introduce these steps in training sessions. Social marketing has been used for planning and implementing a variety of community nutrition initiatives in the United States including Project LEAN, Pawtucket Heart Health Programme (Lefebvre, 1988), Stanford Five-City Project (Farquhar, 1991), Giant Foods' campaigns to promote heart health and decrease cancer risks, and a campaign to increase breast-feeding by limited income mothers (Bryant et al., 1992).

Table 4: Steps involved in planning a social marketing campaign

1. Identify the problem
2. Segment the audience
3. Target the audience
4. Position the "product"
5. Design the "product"
6. Implement and assess effectiveness

When individual instruction and interaction is less feasible and messages are directed to the general public, such as in social marketing, nutrition education message conveyed via mass media must adhere closely to sound principles of communication in order to be effective. Some characteristics of successful messages for bringing about health behaviour change in populations are summarised in Table 5 (McAlister et al., 1982; Lefebvre, Harden, Zompa, 1988; Parlato, Green, Fishman, 1992; National Cancer Institute, 1992).

Use appealing and appropriate instructional methods in training

Personal contact is an effective way to influence dietary behaviour, so face-to-face presentations, demonstrations, and counselling are helpful in nutrition communication. Educators are able to do more effective nutrition counselling on the individual or group level if they have been exposed to these techniques and see them during training.

Instructional methods that are appropriate for the audience of trainers must be selected. Frequently a combination of methods is appropriate. Matching method with specific training needs will help to maximise both method and training effectiveness. Table 6, adapted from Pont (1991), describes a variety of common instructional methods and some of their distinguishing characteristics. Pont (1991) points out that research indicates that "learners retain about: 10% of

what they read; 20% of what they hear; 30% of what they see; 50% of what they both hear and use; 70% of what they say; and 90% of what they say and do".

Table 5: Characteristics of effective messages

- Clearly presented and worded
- Simple and repeated frequently
- Consistent across all methods of delivery
- Maximised credibility of the source and spokesperson
- Anticipates and suppresses/answers counter arguments, suggests actionable next step (especially if using fear as a motivator)
- Gets attention and stands apart from other messages
- Persuasive
- Provides situation and character-identification opportunities
- Distinctive, and with a low fatigue index (to ward off disinterest and boredom after repeated exposures)
- Appropriately appealing (i.e. not too much fear, humour, testimonial)
- Culturally relevant

Table 6: Pros and Cons of Widely Used Learning Methods

Method/Description	Pros	Cons
Lectures Widely used; importance has decreased with an increased emphasis on participative methods	Appropriate for developing background for course, presenting material to introduce a topic, or presenting material supplementary to assignments	Proceed at a pace determined only by the lecturer One-way feedback Strains short-term memory capacity of adults Requires a special kind of self-confidence, performance
Demonstration For hands-on reinforcement or follow-up to lecture, discussion, reading etc.	Attracts and holds attention Easily understood Convincing Ties theory and practice together	Although practice and preparation can help avoid mishaps, they can happen anyway Difficult for everyone to see Learners must be present to benefit from the experience

Discussion An excellent way to cover essential points and allow interaction with individuals in a group; incorporating discussion into lecture allows for an increase in maximum length of time recommended to maintain effectiveness and listening	Can draw out conflicting opinions for constructive discussion; provides a memorable context for information	Lengthens the time needed to get a point across Can be difficult to stay on track Leader/facilitator needs specific skills: must be able to manage a group, including redirecting discussion monopolised by a single topic or person
Active, participatory methods Such as case studies, role plays, simulation and games	Allow for participation Enable participants to learn general principles through interaction and a simulated "real life" situation Help bridge theory and practice gaps Practice in a learning setting can instil confidence in trainees in preparation for the "real life" experiences All group members can be involved	Higher degree of risk than non-participatory methods (unpredictable) Require lengthy preparation Require careful facilitation to benefit maximally Demand time for processing and debriefing following the exercise Clashes of philosophy and style among facilitators may result in difficult situations
Open Learning (Sometimes called distance learning) Allows for learning at a distance from the providing organization. Generally refers to either self-study style instruction of varying lengths, usually in modular form; may include teleconferencing and use of other recent technology	Self-directed, allows for flexibility in administration and participation Variety of teaching media can meet a variety of learning needs Can be used by organisations with few resources for training Modular structure provides time and opportunity for reinforcement between modules (assimilation) Very low risk, non-threatening	Expensive to produce and buy Need good discipline and time management skills with so little supervision and intervention provided Learner is isolated - no group involvement, no group support, limited opportunity for interaction

Guidelines for establishing effective communication with groups and individuals include those listed in Table 7 (Parlato, Green, Fishman, 1992; Holli & Calabrese, 1991). Individual and group skills that are important include active-listening, asking questions, and using appropriate language and gestures.

Knowledge of skills for one-to-one and group instruction/facilitation

Working with groups requires unique skills, different from the skills needed to work with individuals. Communication and teaching methods important for working with individuals and groups are listed in Table 7. Working with individuals is more time consuming, but in that extra time the trainer or nutrition educator can potentially provide instruction based on a more thorough understanding of that member of the target population. Groups can be an efficient way of reaching several people with similar learning needs and interests that capitalise upon social supports and reinforcement by peers. Techniques for managing group dynamics are useful tools. Those who work with groups have the challenge of drawing out the potential strengths of groups, while minimising detractions such as dominant and/or disruptive group members. Often a combination of group and individual instructional methods are most effective for nutrition educators (Parlato, Green, Fishman, 1992). Trainers should use these techniques in training and include them as part of the curricula devised for nutrition educators.

Table 7: Guidelines for working with individuals and with groups

Audience	Guidelines
Individuals	Treat clients as equals rather than as persons of lower rank
	Listen and guide interaction through open-ended questions
	Be empathic rather than neutral, self-centred or judgmental
	Discuss problems descriptively rather than evaluatively
	Make sure advice is appropriate for the individual
	Be able to demonstrate nutrition behaviour(s) recommended
	Help people find individual solutions to their nutrition-related problems
Groups	Acknowledge group members and their individual experiences
	Tolerate silence
	Halt side conversations
	Help the groups stay on the topic
	Guide and encourage involvement without intimidation
	Know when and how to resume control
	Discourage unpleasant or dominant interactions
	Balance speaking with listening and asking questions

Emphasise critical thinking skills

Strong critical thinking skills in trainers and nutrition educators will, among other things, enhance their ability to plan and teach subject matter most relevant to the intervention and audience of interest. Passing these skills on to the public successfully will result in an audience more capable of critically evaluating information and suggestions set before them, and appropriately applying recommendations in a variety of conditions. Both trainers and nutrition educators need to develop their own critical thinking skills if they are to be effective at teaching these to nutrition educators and the public, respectively. Several references are now available for teaching such skills, and these should be incorporated into training sessions (Plavacan et al., 1992; Brookfield, 1991).

Know and use the "tools" of nutrition education

Knowledge of the country's available "tools" for nutrition education is also essential in helping to keep messages consistent and to provide broad guidelines with which to work. "Tools" consist of various dietary/food guidance systems, including the United States' Food Guide Pyramid and Dietary Guidelines. Different subject matter areas within food and nutrition (such as food preparation, purchasing, budgeting, medical therapies, prevention of deficiencies, improving nutritional status) are usually so interrelated that it is possible to teach beginning with a point of individual interest, and eventually convey the message specifically targeted to the population at risk (Brink, 1995). Having standard tools for reinforcement of these messages allows basic information to be conveyed, while also responding to interests in other areas of interest to the population.

Use up-to-date instructional technologies

The potential for new computer-based technologies to increase and improve access to information by parts of the population in industrialised and developing countries, where much of the population is far away from a city or information centre, is tremendous. (Licklider, 1987). Other technologies can also enhance teaching world-wide. Table 8 shows some up-to-date instructional technologies. They include distance learning by radio and TV, and computer-assisted technologies, among others. The most appropriate technology depends on the learning situation, including the subject matter being dealt with, the reading level of trainees, the complexity of the technology required, time, money and availability (Holli & Calabrese, 1991). The training of instructors in the use of new technologies needs to be thorough enough for them to use them in their own teaching. Provision of backup resources, such as clearly written instructional manuals that include directions for troubleshooting, are useful.

Table 8: Summary of Instructional Technologies to use in training nutrition educators

Technology	Pros	Cons	Nutrition education example
Radio	Widely available	Not interactive	Targeted messages to hard-to-reach audiences in developing countries; public service announcements
Television (TV)	Widely available	Need broadcasting capabilities; not easily portable; not interactive	Public TV programmes, public service messages
Videotape	Entertaining if short, can be specific to training needs	Need television; expensive to make; tape sizes must match VCR to show in different places; not interactive	Videos made by organisations with specific, targeted message (i.e. Eat more vegetables, breast feed, exercise)
Audiotape	Inexpensive; portable	Must have recorder to use; hard to concentrate; not interactive	Educational and training tapes
Computer	Can be available for fieldwork (laptops); potential for graphic display; interactive; assessment feedback available for audience with most programs	Requires equipment; requires some expertise and/or training; delicate for fieldwork	Text-based dietary assessment programs; visual-based dietary assessment programmes[1] nutrient analysis capabilities; data collection
Laser disc (CD-ROM and Interactive Video Disk)	High resolution visuals; interactive; multi-media capability	Expensive to produce; requires computer with CD-ROM drive or laser disk player; needs expertise and/or training	Visual-based assessment and intervention programmes[2]
Portable laboratory measurement instruments	Immediate feedback for audience or individual	Needs expertise and/or training; portable instruments may be less accurate	Cholesterol screening kits; body fat measurement machines; rapid assessment techniques to measure serum iron levels
Distance learning	Makes educational opportunities available when they might otherwise be impossible	Needs infrastructure set up; needs a large audience to be cost effective	Satellite conferences around the world; World Wide Web servers in the Internet

[1] Self-Reported Dietary Assessment (SRDA) program. Hernandez T. JWK International Corporation, Annandale, VA.
[2] Hispanic Multi-Media Assessment (HMMA) program. Hernandez T. JWK International Corporation, Annandale, VA.

Many external, practical factors limit the application of technologies in training of nutrition educators, including unwillingness on the part of instructors to use them, lack of money, skills or facilities, or lack of back-up technical support. Small, mundane details must be attended to and can be quite disruptive if ignored: availability of power outlets, running water, air conditioning or ventilation for computers in hot climates, lighting, access, etc. With the advent of more recent distance learning technologies, the geographical location of trainees and means of access to them are also considerations.

Make objectives fit with the duration and location of training

A balance must be struck between the time needed to complete the necessary teaching/training and the length of time adults can remain alert in a learning environment. Table 9 provides some ideal conditions and brief comments regarding different training lengths. Training sessions often need to be compressed into several days of intense instruction. It is easy to become bored if the teaching styles are monotonous. Incorporating discussions and hands-on exercises can help to break up long blocks of time and lessen fatigue. Table 10 contrasts the pros and cons of centralised, on site, and distance learning locations.

Plan field experiences to bring training to life

After some initial instruction, it is helpful to provide field experiences that offer the opportunity for relevant interactive and hands-on experiences for trainees. They also provide the instructor with a chance to observe and evaluate trainees in a setting outside of the "classroom". Planned experiences may relate to any of the topics already covered or those coming in the future. Such experiences will help build a high level of competency and comfort with all material and techniques in trainees. Examples of such field experiences include trainer-observed instruction by nutrition educators in groups (local clinic) or with individuals (home visit).

Table 9: Options and pros and cons of different training lengths

Training Frequency	Ideal Conditions	Comments
Consecutive days	Full but not long days (i.e. 9-3) with breathing breaks and a lunch break to decrease fatigue	Shorter rather than longer days help maximise absorption of material and minimise negative effects of fatigue. If travel is required, consecutive days may be the only option
Once a week	Several hours weekly over consecutive weeks	Provides opportunities for practice in between sessions and reinforcement of material through follow up in subsequent sessions
Initial training with follow up sessions	Short initial training with regular, on-going supervision and evaluation	Allows for ongoing guidance and learning after main, initial training. Provides opportunities for practice between training sessions

Table 10: Options and pros and cons of different training locations

Training Location	Ideal Conditions	Pros	Cons
Centralised	Closest large city to rural area targeted	Variety of facilities and resources available; more likely to be an information centre; easier to plan for distance learning opportunities	Transportation difficulties possible for those coming from far away; location may be very different from location of target population, limiting relevance of field practice
"On site"	Close to targeted communities	Fewer transportation problems for local trainees; opportunities for highly relevant practice in the field	Rural areas may have fewer options for meeting place, technology, and professionals
Distance learning	Easily accessible location	Everything happens in one place; usually a centralised location	Need transportation if centralised location is far from participants; practice in the field not included

Address professional perspectives and personal values

Training sessions should address and discuss some of the more personal aspects of the individual being trained as a nutrition educator. Obvious inappropriate behaviours, such as cultural biases, prejudice, poor communication, judgmental and condescending attitudes, need to be discussed if individuals possessing these characteristics were not screened out while selecting potential nutrition educators.

Pre-existing value judgements by nutrition educators may have an impact on client interrelationships and can affect the way they communicate nutrition messages to individuals. The absence of respect for, and a caring attitude towards, all audiences while delivering messages/teaching diminishes the receptivity of the target audience and may jeopardise the entire nutrition education endeavour. This applies to issues involving some of the more obvious and sensitive possibilities for discrepancies between nutrition educator and audience, including class, race, and gender.

The inculcation of self-direction in learning and practice is a requirement of a good adult educator, and also a reflection of good in-service training and education. A nutrition educator who can separately assess each teaching situation and adjust the experience accordingly, as well as critically evaluate the success of each contact and revise future efforts accordingly, is one who will be well-equipped to take on the task of facilitating nutrition behaviour change in a target population.

Evaluate training efforts

Classify the type of outcomes desired

Outcomes can be regarded as cognitive (knowledge), behavioural (response to information), health (anthropometric, biochemical and clinical measurements, morbidity and mortality statistics) and system (institutionalisation, in that a message is incorporated in the content of other development messages and projects). These need to be explicitly stated. The specific parameters for success, or the size of effects may change in magnitude or specification over time.

Edwards, Mullis and Clarke (1986) describe several issues in evaluation research as important to consider for a thorough and comprehensive evaluation of nutrition education programmes. First, evaluation efforts should be flexible and interactive, and be used throughout the development of a new programme so that findings can be used to change future programme and subsequent evaluation procedures. Second, assessing qualitative data as well as quantitative data provides useful information, for example instructor and participant perceptions of course materials and instructional strategies. Integrating measures of process and performance reveals clues to explaining performance data. A closer look at process includes evaluation measures of a programme at each level of the organisational structure (i.e. client, instructor, and agency) and helps understand the overall functioning of the programme and all aspects which, directly or indirectly, affect outcome.

Measure short-term effects

Trainee competence with respect to knowledge processes and skills must be assessed both during and after training, to evaluate the overall effectiveness of the training and the achievement of the individual. Evaluation of the trainee should be based on the objectives of the training session - what the trainee must know to function effectively in the field. Paper and pencil evaluations by pre- and post-tests, quizzes and practicals, as well as evaluation by observation, such as requiring presentation or hands-on demonstrations, are both usually needed to assess the abilities of each trainee. Mid-course evaluations can provide immediate feedback and it is often helpful to build-in some test at the end of each training session. Also, participant feedback following training sessions provides valuable information for the planning of future sessions, and it should be solicited.

Measure long-term effects

Evaluation of trainees immediately following the programme is both necessary and useful. Long-term evaluation measures the "true" effectiveness (long-term outcome) of the training effort against the long-term goals and objectives of the larger intervention. These may be changes in knowledge, attitudes, or behaviour. Evaluation methods must be appropriate for the goals and objectives of the programme.

Regardless of the type of outcome desired or the time frame for its accomplishment, long-term evaluation must include baseline measurements on the same population, or some acceptable proxy for it. In interpreting results, secular trends and other possible factors

contributing to behaviour change measured during the time of the intervention must be considered. Humans change their behaviour for many reasons. Therefore, all possible explanations must be considered (Rice & Foote, 1989). For example, measures may indicate that nutrition educators were successfully trained and performed their tasks well, but behaviours in the population did not change as expected in the given amount of time. Many uncontrolled variables, such as a sudden recession, might prevent learners from putting principles into practice because of lack of money. Attributing changes in behaviour to specific interventions has become difficult in the United States where secular trends and many community/public health campaigns, in addition to media attention, have focused on decreasing fat in the diet. Today it is nearly impossible to credit any one message or circumstance for doing this. In less industrialised settings with a dearth of public health efforts, a single intervention's effects may be much easier to quantify.

Reformulate and improve training based on results

Short- and long-term evaluation results are useless if they are not used to improve training programmes in the future. Analysis of both process and outcome evaluation together provides the most information with which to locate and revise contributors to less than desirable outcomes.

TRAINING PROGRAMMES FOR NUTRITION EDUCATORS

After the nutrition educators have been successfully trained and have demonstrated that they are knowledgeable, competent and skilled, more specific areas of expertise must be acquired before they are ready to go into communities to teach. This section addresses these more specific issues.

Base programming on knowledge of food, nutritional needs, and problems of the population and sub-groups by employing needs assessments and other techniques

At the outset, the population most in need of nutrition education needs to be identified, and nutrition educators need to know how to do this. Such needy groups often include infants and young children, pregnant and lactating women, and the elderly. Populations may also be targeted by risk factors for disease (i.e. breast cancer in the family, chronic hypertension, high cholesterol levels, etc.).

Conduct qualitative and quantitative baseline assessments of target group

Baseline assessments of the target population with respect to their food and nutrition problems, needs, and attitudes, are crucial to developing a nutrition education campaign which will change behaviour and improve health. Knowledge of the audience is critical for health messages. Such information is used widely today in social marketing as well as in product-focused messages by marketers.

Qualitative methods of needs assessment include using focus groups and surveys, or compilation of information on knowledge, attitudes, and practices of the target group. Quantitative assessment tools include anthropometric measurements, such as height and weight

(plotted on growth charts), morbidity and mortality statistics, information on dietary intake, and information on biochemical and clinical measures of nutritional status from screening tests or surveys.

Identify factors to be changed in the target population

Identify barriers to better dietary habits and better health

Once the population needing help is identified and characterised through the use of qualitative and quantitative methods, the next step the nutrition educator takes is to identify major factors affecting food habits that can be changed. This information will help to identify barriers to better dietary/food habits and better health that can be overcome. In addition to lack of knowledge, other factors influencing nutritional status and dietary habits usually include economic, cultural, and social factors, individual preferences, lifestyles, and time constraints. Nutrition education cannot address all of these problems or overcome all of the barriers they create (Parlato, Green, Fishman, 1992). Therefore realistic objectives that stand a chance of success must be chosen.

Be aware of factors affecting local food supply as well as individual dietary behaviours

For solving some problems, the nutrition educator's knowledge of diet-related factors affecting health should also include knowledge of the local food supply and of the health and education sectors. Nutrition educators must be aware of all the aspects of food-getting that may be affecting health: acquisition, selection, preparation, storage, and consumption. Their knowledge must also include a broad range of factors affecting the food supply, in addition to individual dietary behaviours. Specific information describing the food and food habits of the target population should also be available to nutrition educators. This information is summarised in Table 11.

Table 11: Knowledge of local food and foodways useful to nutrition educators

What	Includes...
Nutritional value of foods	Food tables (as relevant to country), charts, computer programmes, etc. With a proper introduction on how to use them, and opportunities for practice, evaluation and feedback, much valuable information is available
Effects of processing (preservation and cooking) on nutrient values	Knowledge of the effects of food preservation and cooking on nutrient values, to include local methods of keeping food and popular/traditional cooking methods. Relevant questions may involve issues about whether any of these compromise the nutritional value of the food such that they should be changed
Food safety and hygiene	General information on foodborne illness and pathogens most likely to affect target audience

Selecting foods for sustainability and good nutritional and economic value	Need knowledge of indigenous food supply (what is available and at what cost); seasonal trends affecting cost; how to best store foods to make them last longer and keep nutritional value
Knowledge of production and marketing of foods ("Foodways")	Knowledge of how the food is produced, processed, distributed, regulated, marketed, etc.; and how these factors affect eating/nutrition behaviours targeted for change and health improvement
Consumer issues	Factors affecting access to food and food choices available to your target population as consumers
Practical skills as needed	How to: cook, preserve foods, practice safe food handling techniques, etc., especially skills which need to be taught or modified to improve nutritional status

Consider other influential factors that induce acceptance

A thoughtfully delivered, clear message is effective only if it addresses some factor that influences the behaviour of interest in the learner. Other factors that influence food and nutrition-related behaviours include values, attitudes, social and cultural norms, perceived social pressure, a sense of personal competency and control, and perceived rewards and other motivators that may result from following the recommended behaviour. Barriers to consumer education include, among others: language used, illiteracy, and the existence of conflicting messages (Macfarlane, 1993). Individuals with experience and insights about the target population's views on these issues, levels of understanding, and conflicting cultural beliefs or messages, may be helpful in identifying these factors and useful in training.

Use the media effectively

Rules of thumb for appropriate use of the media to communicate the message are included in Table 5. Local media channels used most frequently by the target population should be considered (within budgetary constraints). The use of "mini-media", such as church bulletins, worksite publications, and bulletin boards at various organisations, can also be very useful in reaching individuals where they work and play, although they are often underused in public health programmes (Lasater, 1988).

In-service education of nutrition educators should be accompanied by back-up assistance for communicating, disseminating and marketing their messages. One way to help them is to identify local channels of communication, such as local media (radio, TV, newspaper), some basic community action skills including locally appropriate methods of contacting key leaders in the field and political figures with whom it may be helpful to network.

Develop support strategies

Look within the community to develop support for interventions

Apply interventions with, rather than to, a community or group. This implies developing supportive structures in the community. Sophisticated health education efforts involving many aspects of the community have been well reported in the literature (Pirie et al., 1986; Linnan, 1990; Flora, Maccoby, Farquhar, 1990). Looking to the community for involvement is advantageous because communities can provide both valuable human resources and sources of support among the target audience that cannot be simulated or equalled by external efforts. The nutrition educator needs to know how to select and implement appropriate support strategies for education and communication efforts. These include skills in mobilising social support, using home gardening, school meals, and otherwise involving the community through organisations and community leaders.

Reach audiences beyond health systems in places that are familiar

Adult learning theories emphasise the advantage of working in a relaxed, trusting, mutually respectful, informal, warm, and collaborative climate, which supports efforts to reach people in their day-to-day comfortable, relevant settings. This is what is meant by a "supportive environment". Educating people where they work, live and play rather than just within health systems must be considered. Such settings include households, local communities, schools, worksites, markets and shops, and recreational and cultural settings which are closer to the point at which food choices are actually made. The United States' "5-A-Day" Campaign for increasing the consumption of fruits and vegetables targeted people in a work setting and has made use of the particular attributes of this environment for a nutrition education campaign (Sorenson, 1990).

Know and choose appropriate networks and contacts for nutrition education

Develop skills for long term collaboration and institutionalisation of programmes into community life

Community interventions seek to change organisations and environments as well as individuals. The nutrition educator must keep in mind that his or her work is in a long time frame since the aim is for permanence in community life. The goal is community improvement over the long run (Parlato, Green, Fishman, 1992). Therefore the nutrition educator needs to develop skills that permit collaboration with a range of different organisations and disciplines over a long time.

Influence and seek co-operation with community leaders and pre-established networks

Community leaders and networks are often effective channels for promoting solutions to nutrition problems. Community involvement and commitment should therefore be sought at various levels. The accomplished nutrition educator uses the influence of community members, such as officials, elders, group leaders, and community health volunteers, as well as contacts with "higher ups" in the community who can make efforts work more smoothly, and without

whose co-operation the efforts may be difficult or impossible. For example, the Pawtucket Heart Health Programme in the United States turned to the community for volunteers and was able to staff many programmes with these resources. It also formed alliances with organisations including the local Department of Parks and Recreation, which provided facilities for unique opportunities in the campaign (Lasater, 1988). The Thailand vitamin A project integrated many influential people from all parts of the community and used them as channels in their efforts to reach village residents with their messages. Some of these channels included: district agriculture and primary school offices; district education offices; school and village communities; village volunteers; health centres; Buddhist monks; mobile drama groups; folk singers; and public address systems, radio spots and programmes, audio-visual materials and billboards.

Collaborate with other organisations for more efficient and effective use of resources

The nutrition educator needs to know where and how to obtain an appropriate audience. Other agencies may share concern about the target population and may be ripe for collaboration. Sharing outreach efforts, facilities, channels of communication, and even education campaigns, are opportunities for using resources more efficiently and perhaps increasing effectiveness.

Ensure that specific knowledge needs for the task at hand have been imparted

Content as well as process are important in nutrition education. After assessment and targeting of those in need of nutrition education, some information and skills need to be transmitted. The subject matter detail that is necessary depends on the prior skills and knowledge of the nutrition educators who are trainees, and also the task at hand. While providing more facts in training does not increase effectiveness as educators, more knowledgeable educators may have more credibility with their audience and should be included in the training as appropriate.

OTHER CONSIDERATIONS

Before launching in-service training programmes for nutrition educators, careful consideration needs to be given to the circumstances for which nutrition education is an appropriate intervention.

What causes of malnutrition can be remedied by nutrition education?

Clarify goals of intervention

Before embarking on nutrition education or training endeavours, the context and rationale for efforts need to be established. The following questions must be asked and answered: What factors contribute to the inappropriate or inadequate nutrition knowledge and food practices? Is the goal of the programme to increase nutritional knowledge, or to provide skills for making healthy dietary decisions to maximise nutritional status, or both of these?

Nutrition education can rarely remedy malnutrition alone

Nutrition education is an appropriate intervention only when a lack of food and nutrition knowledge, attitudes, or skills, harm the health or well-being of the individual or those she or he is responsible for. When factors other than lack of nutrition knowledge cause poor nutritional status, these also need to be addressed. Informational or educational efforts to combat undernutrition are ineffective unless they are culturally relevant and geared to the target group's interests.

What are some other causes of malnutrition and how can they be addressed?

- Multifactorial economic and social inequalities contribute to malnutrition:

Many of the problems related to the ill effects of improper nutrition are due to economic and social inequalities. For example, among the poor in developing countries, undernutrition is a problem that is often due to inadequate food supply, limited purchasing power, poor health conditions, and incomplete nutrition knowledge (Berg, 1987). Problems of poorly nourished populations in developing countries are multifactorial and include disease, lack of education, poor education, other circumstances associated with poverty, and unequal distribution of food resources, not only within society but within families, as well as lack of nutrition knowledge. Abundant research shows that in situations of poverty, where food inadequacy exists, food-assistance programmes must precede educational interventions. Thus, it is especially important in developing countries to integrate nutrition education into broader programmes that encompass agricultural and food availability issues. Nutrition education must also be appropriate for the biological, cultural, economic, social, and cognitive contexts in which the programmes operate.

- Psychopathology:

When undernutrition is present, the causes may sometimes include not only insufficient economic resources to purchase adequate diets, or inappropriate food distribution in the family, but also psychopathology. This is particularly likely in affluent countries. Infants who fail to thrive and adolescents with eating disorders often come from disturbed families. Programmes to address prevention of failure to thrive (Pollitt, 1994) and eating disorders (Nagel & Jones, 1993) must also include both nutrition education and attention to these psychosocial issues.

Status of women

The status of women also has an impact on the effectiveness of nutrition education, especially in developing countries. In developing countries women have multiple social and economic roles, long working hours, and less access to education and nutrition than males (Brown, 1990). Yet it is they who are responsible for the alimentation of their families. The international human rights movement has neither considered nor remedied the low status of women, although it has called for respecting the political rights of people in general (Bunch & Carrillo, 1991). Gender discrimination and violation of women's rights deny many women education, health care, and good nutrition.

Economic and political instability

Developing countries must currently make "structural adjustments" in the economy, and austerity measures, which have a great social impact on food availability, may be implemented to cope with economic instability (Bradshaw et al., 1993). The latest international statistics on the effect of different social indicators, including level of nutrition, present a bleak picture, especially in poorer countries experiencing economic crisis, such as Mexico, certain other Latin countries, and Eastern Europe. Political conflict and wars increase already existing inequalities. During the Gulf War, there was a dramatic increase in malnutrition that threatened the lives of over 250,000 children under the age of 12 (UNESCO, 1991; Field & Russell, 1992). Violence in Croatia and Bosnia, in several countries in Africa, and in the countries making up the Former Soviet Union have also increased malnutrition. Political strife in Haiti, Somalia, Iraq, Cuba, and Chechnya may have led to food shortages, and under- and malnutrition in vulnerable groups. Education to improve food choices and handling under conditions of war may alleviate some of the impact on nutritional status as limited knowledge may contribute to the undernutrition seen in these circumstances, but undernutrition rarely yields to nutrition education efforts alone.

Developing countries

Environmental influences on nutritional status differ in degree between industrialised and developing countries, but are evident in both (Scrimshaw, 1993). For example, the effects of poverty on child development, links between anaemia and decreased levels of mental and motor development, the positive effects of supplemental nutrition programmes on child development, and the ill effects of poor nutrition and concurrent illness on school performance, are present in both poor and rich countries (Pollitt, 1994).

Ill-effects of malnutrition are well substantiated

Poor early childhood development, low productivity, violations of human rights and women's rights, and abject poverty all combine with lack of nutrition education to cause malnutrition in populations. Evidence for the deleterious effects of inadequate food is substantial. Foster and Rosenzweig (1993) reported that intakes of food energy had adverse effects on productivity in the Philippines, India and Pakistan. Khurana (1992) reported an association between malnutrition and lack of basic literacy skills among children in India. But in many developing countries, in addition to dietary inadequacy, nutrition-related feeding problems exist in early childhood development. The ill effects of improper nutrition early in life are many, and may sometimes be irreversible. Myers (1992), analysing the situation in Latin America, concluded that intellectual development, personality, and social behaviour were all severely impaired by lack of good nutrition. Glewwe and Jacoby (1993) indicated that nutritional deficiencies in early childhood in Ghana were associated with delayed primary school enrolment.

Nutrition education must be included as part of the solution

Prognoses of the nutritional status of populations around the world are not so negative that we should surrender to a future of malnutrition. The late, former-UNICEF Director John Grant (1993), analysed the State of the World's Children and found hope in the post-cold-war

world. He indicated that now the means were at hand to end mass undernutrition, preventable disease and widespread illiteracy among the world's children. The estimated cost was only US $25 billion per year in additional aid to developing nations. Experts agree that if we are to address these problems, nutrition education must be included as part of overall development efforts. Risks of malnutrition cannot be addressed by nutrition education alone, but nutrition education is appropriate, and can be effective, in situations where food is available but food practices are inappropriate or uninformed from a nutritional standpoint. Frequently, such lack of knowledge is only part of the problem, and therefore for nutrition education to be most efficient and effective, it should be delivered along with programmes that provide the other components that are lacking.

The 1990 UNESCO "Education for All" conference (Fordham, 1992) called for enhancing the learning environment through early childhood care and education about health and nutrition. In 1991 in Lisbon, Portugal, education specialists from 51 countries concluded that systematic and continuous social and familial action, beginning in early childhood and continuing until maturity were necessary to tie together pre-school education, health, nutrition, and social service programmes in to effective intentions. Others have also emphasised the need to sustain nutrition education in the context of overall promotion of maternal and child health (Dwyer, 1990; Wallace, 1988).

Industrialised countries

In highly industrialised countries such as the United States and Western Europe amongst others, efforts to provide information to consumers so that they can make informed choices have been popular. In these countries, chronic degenerative diseases that have been linked to diet are more prevalent than undernutrition as causes of malnutrition (USDHHS, 1990).

Individual choice contributes to malnutrition through chronic disease

In these countries the choices of individuals, rather than insufficient incomes for purchasing adequate diets, make up most of the malnutrition problem. Many long-standing lifestyle factors, in addition to dietary patterns of excess, contribute to ill health and the development of chronic degenerative diseases that are common in those countries. These diseases include coronary artery disease, hypertension, non-insulin dependent diabetes mellitus, obesity and alcoholic liver disease (National Research Council, 1989).

Successful Programmes Focus Both on Lifestyle Factors and Diet

Programmes to decrease risks of these disorders are most effective when they include attention to lifestyle factors in addition to diet, as do programmes such as the National Cholesterol Education Programme (NCEP, 1987) and the National High Blood Pressure Education Programme (NHBPEP, 1988). Innovative, experience-based teaching techniques are also needed. For example, Fletcher and Braner (1994) report that an effective way of teaching children about nutrition is for them to prepare their own foods and to instil awareness of ethnic and cultural influences on food choice.

Institutional arrangements and resources for nutrition education

The institutional arrangements for nutrition education and training already in place within a country vary. Usually it is necessary to build programmes on these bases. Lead responsibility for each aspect of nutrition education should be clear whatever the institutional arrangement.

Both efforts sponsored by international and bilateral organisations (country to country) may be involved, and these may include not only governmental but non-governmental organisations as well. When the government is involved, in some countries, one institution or sector is designated as responsible for training. In other countries, responsibility is shared by several sectors (e.g. health, agriculture and education). The degree of centralisation of control over programmes also varies. Responsibility may lie with a centrally located group or less highly centralised structures may exist. Finally institutional structures may include only a single discipline or multiple disciplines.

Know organisational resources

Those who wish to develop in-service training in nutrition education must be familiar with the organisational resources and channels for communicating within these structures for developing training programmes. Imposition of in-service training in nutrition education by international organisations with little or no involvement by groups within the country is unlikely to succeed. Co-operation at the government level will make some aspects of training easier than efforts relying unilaterally on voluntary groups. Countries where interdisciplinary teams have already been formed with a mutual interest in nutrition (i.e. Thailand, with Ministries of Health, Agriculture and Education working together) may have systems in place for training and delivery of education which can be used. Large government organisations typically have specified procedures for training staff, which may be necessary and useful to incorporate into training plans if funding is to be obtained from the government agency. For example, in the United States, the Nutrition Education and Training (NET) Programme was established to support the training of nutrition educators of school age children (Ullrich, 1992), and training is built into the mission of the Co-operative Extension service organisations at the Federal and State level. These organisations exist to translate research information into practical terms, and to bring it to people in target groups who would otherwise not have access to it. In planning and training, nutrition interventions can be linked to other health and socio-economic development programmes.

Investigate other organisations with and interest in nutrition education

It is also useful to investigate the willingness of other government, industry and volunteer organisations to cooperate in developing in-service training. They may have aims which overlap with or involve nutrition education. Monetary or in-kind assistance may also be available for nutrition education training programmes from these sources if their goals and objectives are consistent with those of these funding organisations.

CONCLUSIONS

Plan carefully

Thorough and thoughtful planning for training of nutrition educators improves the likelihood that desirable outcomes will result. In the best of all worlds there would be time, money, facilities, willing and capable volunteers, good channels of transportation and communication, co-operative government, and well-established organisational structures in which the trainer could operate. In the real world, this is often not the case and many barriers exist that cannot be overcome even by the most careful planning. Nevertheless, careful planning, coupled with the flexibility to modify plans to overcome barriers, is likely to achieve more than unplanned efforts.

Tailor context to learners' experiences

The content of training sessions should be partially determined by the experience of the selected nutrition educators. While subject matter must be provided to prepare credible educators, educators must also be prepared to communicate their messages effectively.

RECOMMENDATIONS

Special considerations applicable to developing countries

The guidelines for in-service training of trainers and nutrition educators apply both to industrialised and developing countries. However, there are some practices which are especially important for furthering nutrition education efforts in developing countries. First, it must be recognised that in developing countries, economic resources for health are limited. However, it is also true that existing resources are not used to their full potential (World Bank, 1980). More attention to planning and management may be helpful in this regard.

Planning can provide better utilisation of a programme, and effective management assures that the programme is efficiently administered and prevents a crisis management approach. In-service training of nutrition educators must adequately address questions of planning and management, including the manner in which the training is to be conducted, and the larger societal effects. General guidelines, especially appropriate for in-service training of trainers and nutrition educators in developing countries include the following.

(i) Assess the developing society's relevant characteristics

Nutrition education programmes rarely exist by themselves; they must be examined in a broader context rather than considered in a vacuum. Political attitudes and social traditions affect the way people nourish themselves, as does the way a society conceptualises nutrition-related issues.

Trainers and nutrition educators, as planners and administrators, must use information provided by local respondents. Often health professionals and government

administrators are unaware of, or unable to, provide information about the local situation.

(ii) Determine availability of human resources

Censuses of trained personnel and their locations, frequently carried out by direct site-by-site observation may provide more up-to-date and accurate data. Generally, most highly educated professionals, including physicians and health workers, are concentrated in the urban areas (Phillips and Verhasselt, 1994). The in-service training of rural nutrition educators presents special challenges since so few trained personnel are available. An effective way to increase the probability of a programme's success is to invite and encourage the participation of community leaders and teachers.

(iii) Set priorities

When faced with seemingly insurmountable social and economic problems, administrators and planners in developing countries often find it difficult to make decisions. Determining the most important issues to be addressed may assist in finding a proper balance between what is urgent and what is important, and in mobilising efforts.

(iv) Assure low cost programmes

The most important health programmes are those that have maximum impact at the lowest possible cost (WHO, 1978). Maximum impact is determined by attending to highest priority issues and lowest cost by using all available resources effectively. Berggren et al. (1981) and Gwatkin et al. (1980), have effectively lowered infant mortality rates through the operation of moderately priced, effective programmes.

(v) Take into account effective communication techniques in nutrition programmes

Effective communication techniques, derived from marketing and the behavioural sciences, and based on studies in the target group, are frequently lauded as most appropriate and successful for understanding and changing nutrition-related behaviours in various social contexts.

(vi) Overcome barriers to effectiveness of training

Some consumer education barriers include language, illiteracy, and the existence of conflicting messages (Macfarlane, 1993). Many developing countries are multilingual, and much scientific and technical information is not available in the indigenous language. Ideally, the training of trainers should be provided in the language in which recipients are most likely to learn. Trainers should know those languages and adapt the level of language used to match the characteristics of the learners. Illiteracy, or lack of understanding of language used in teaching, may also be a problem of the target

group. Audio-visual technology and aural messages can be used to present or reinforce the message.

Training of nutrition educators should recognise the heterogeneity of messages and the existence of varying opinions and find a way to resolve these incongruities without providing false or misleading information.

(vii) Incorporate distance education techniques when feasible

Recent advances in distance education make it possible to implement multiple on-site training for a large or small number of nutrition educators who are providing face-to-face instruction. Pre-recorded relevant information can be projected or sent to the trainees. Distance education is also useful for reinforcing face-to-face training, using radio, television, and pamphlets mailed to recipients. Distance education is also useful for updating nutrition educators.

(viii) Emphasise the development of a back-up system of supervision and support for nutrition educators working in the field

The trained nutrition educator needs to have a good support system to count on, especially if she or he is geographically isolated. This support system ensures that the programmes can be sustained. (Wray in Perry, 1988):

> *"No matter how well-intentioned the programme, no matter how adequate or inadequate the training, unless auxiliaries (including village health workers) are part of a system that is capable of providing them with satisfactory guidance when needed, the necessary supplies and equipment to carry out the tasks assigned to them, and a referral system to which they can send problems with which they cannot deal, they are not likely to be able to function effectively."*

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DEFINITIONS

Education involves empowering the learner to take interest in the subject, and apply knowledge gained to make decisions that involve situations other than those specifically presented in training, and to integrate this knowledge with experience.

Nutrition education is a process by which people are assisted in making decisions about eating. Its ultimate goals are to improve the recipients' nutritional status or other aspects of their nutrition well-being through both knowledge acquisition and behaviour change skills (Devine 1988, The American Dietetic Association, 1986). Generally, the goal of nutrition education is to change specific dietary behaviours which contribute to the poor health of the public. However, other considerations such as taste and enjoyment must not be forgotten if efforts are to succeed.

Nutrition educators design, implement and evaluate programmes to help people understand healthful food consumption practices and gain skills to develop and maintain positive food and nutrition behaviours and nutritional status (Anderson, 1994). A crucial aspect of this work is to transform technical, scientific information into simple skills and practices that lay persons can put into action (Devine, 1988). An all-encompassing definition put forth by the Society for Nutrition Education regarding the Academic Preparation of the Nutrition Education Specialist states that a nutrition education specialist is "a professional who is trained in the fundamental principles of human nutrition, learning theory, and educational methods including behavioural change strategies. This professional nutrition educator designs, implements, and evaluates nutrition education programmes which focus on developing and maintaining positive food and nutrition behaviours" (Ullrich, 1992).

Distance education is education in which the learner is not in the same location as the trainer, and communication is via technology.

Training is the time during which instructors, with knowledge, resources and expertise, teach the learner new skills. It is also referred to as a training session or in-service training. Training also implies efforts to achieve competence in a certain specific skill. The result of training in nutrition education should be competence to teach in a certain area of food or nutrition. Formal adult education is often referred to as "training". The emphasis is on formal instruction addressed to enhancing immediate job-related skills or remedying problems on the job (Yerka, 1981).

Trainers are those who instruct nutrition educators by organising and implementing nutrition education training programmes. Trainers may be individuals with backgrounds in fields other than nutrition.

In-service implies that training is required, paid for, or at least strongly encouraged by employers and that it is related to a job. Those who are trained are usually adults who continue to work while they are being instructed.

In-service training sessions can be designed for adults not previously familiar with the field (these are known as initial, or core, in-service training sessions) or as part of ongoing efforts to

maintain competence among those who are already experienced in a field (often referred to as continuing education or booster training.)

The content of in-service training instruction should vary depending on the needs of the trainees. This can be discovered by conducting a needs assessment. In actuality in-service training is all too often based on the existing subject matter strengths or presuppositions of the instructors. For example, if those whose disciplinary background is nutritional science do the training, there is a tendency to focus on detailed descriptions of intake and physiological aspects of nutrition problems rather than developing trainees' communication and education skills (Yerka, 1981).

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Evaluation of nutrition education programmes: Implications for programme planners and evaluators

Arne Oshaug[1]

INTRODUCTION

In the literature discussing nutrition education projects, evaluation is generally mentioned. At the same time it is underlined that a nutrition education programme is usually only one component of a strategy designed to ultimately influence individual behaviour to solve nutritional problems (ICN, 1992). Evaluation should therefore be integrated in the whole process from start to finish, and must necessarily assess the effect of all types of interventions in a nutrition education strategy. This paper will discuss how nutrition education programmes can be evaluated, how an evaluation system can be developed, how different types of evaluation methods can be used in data collection, how to measure efficiency of programmes, and which skills are needed in evaluation of nutrition education programmes.

Programme managers and planners need to be accountable to funding agencies and policy makers. They must, therefore, distinguish useful current programmes from ineffective and inefficient ones, and plan, design, and implement new efforts that effectively and efficiently have the desired impact on the target group. To do so they must obtain answers to a range of questions, such as: is the strategy based on priorities from a broad analysis of the nutrition situation, needs assessment, and cultural and behavioural aspects? Are the interventions selected likely to ameliorate significantly the nutrition problems? Is the most appropriate target population selected? Will the various interventions reinforce, or counteract each other? Is the intervention being implemented in the ways envisioned? Is it effective? How much does it cost? If the nutrition education programme is one of several interventions, how can its effect or impact be separated from the impact of other interventions?

Many more questions could be raised, but with those already mentioned, one sees that the scope of evaluation is wide. Evaluation activities range from simple counting of events, to very complex and sophisticated qualitative and quantitative analysis. Evaluation theory and procedures are basically the same in various interventions such as health, education, welfare, and other human service policies and programmes. The distinction between the use of evaluation in the various approaches lies primarily in the focus of the evaluation (Rossi & Freeman, 1993).

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In the last 25-30 years there have been many success stories and failures for interventions in education of the public (Klein et al., 1979; Weiss, 1987; Chapman & Boothroyd, 1988; ICN, 1992; Oshaug, 1994; Luepker et al., 1994). These experiences have brought about a more realistic perspective on the barriers of successful implementation of nutrition-related programmes, and the impact that can be expected from them. In a world with resource limitation and more realistic expectations from nutrition programmes, the need for evaluation efforts increases as societies attempt to cope with food and nutrition problems as part of their human and social distress.

BACKGROUND

Much of the literature on evaluation presents conflicting viewpoints on choice of paradigms, definition, practical approach, choice of methodology for data collection and analysis, and use of the results. Many attempts have therefore been made to clarify the meaning of evaluation and unmask the distinction between evaluation and other related concepts such as assessment, measurement or research. Still the picture is not clear, and in 1981 Stake rightly pointed out that many arguments resembled persuasions (Stake, 1981).

For the benefit of those who lost their way among the various evaluation models, approaches, and persuasions, several attempts have been made to put some order into the growing evaluation literature through classifications of evaluation approaches (House, 1980 and 1986; Stuffelbeam & Webster, 1980; Guba & Lincoln, 1981 and 1989; Oshaug, 1992; Rossi & Freeman, 1993). Based on these critical reviews, several dimensions in a conceptualisation of evaluation have emerged.

THE PURPOSE OF EVALUATION

Why evaluate?

Society, which finally pays the bill for nutrition education activities, has a right to know how resources have been used and the final impact of educational programmes. Evaluation of educational programmes are undertaken for several reasons: to judge how the nutrition education programmes are planned and executed, how the programme personnel have performed, and to increase the effectiveness of programme management and administration; to assess the utility of new programmes; and to satisfy programme sponsors (see Figure 1) (Oshaug, 1992; Rossi & Freeman, 1993; Oshaug et al., 1993). In all evaluation efforts it is very important that the purpose of the evaluation is clear from the beginning.

The functions of evaluation

Evaluation of nutrition education programmes includes not only collection of qualitative and quantitative data, but also their analysis and interpretation for the purpose of making judgement and decisions. In this context, evaluation is seen to have two main functions: *formative* and *summative*. Formative evaluation is used to improve and develop programme activities as they are carried out, and is therefore continuous. Summative evaluation measures the outcome of an activity or set of activities (Oshaug, 1992). It is also

used to satisfy the accountability[2] requirements of programme sponsors. By providing feedback or involving people in evaluation activities, programme beneficiaries can be motivated about its usefulness. Furthermore, evaluation may have psychological or socio-political functions as it is used to increase the awareness of educational activities or promote public relations. Another function is to facilitate supervision. In an organisation responsible for a nutrition education programme, it is the responsibility of a manager to evaluate personnel and programme activities under her or his responsibility. This may be referred to as the administrative function of evaluation (see Figure 2) (Oshaug, Benbouzid & Guilbert, 1993).

Figure 1: Reasons for evaluating nutrition education programmes

To assess:
• impact or effect,
• how programmes are planned and executed,
• how programme personnel perform,
• how effectiveness can be improved,
• the utility of a programme, and
• to satisfy the programme sponsors.

Figure 2: Functions of evaluation

• Improve and develop activities of programmes as they are carried out
• Measure outcome
• Accountability
• Provide feedback to or involve beneficiaries in evaluation activities
• Create or increase the awareness of educational activities
• Promote public relations
• Evaluate programme personnel
• Facilitate supervision

[2] Rossi and Freeman (1993) discuss six common types of accountability studies in established programmes, directed at providing information aboul various aspects of programmes to stakeholders: 1. Coverage; 2. Service; 3. Impact; 4. Efficiency; 5. Fiscal; and 6. Legal accountability.

Definition of evaluation

One dimension, and a recurrent question is, how to define evaluation. Guba and Lincoln (1989), agree that it is reasonable to begin with a definition of what we shall mean by the term *evaluation*. They proceed, however, by stating that definitions of evaluation are human mental constructions, whose correspondence to some "reality" is not and cannot be an issue. Therefore, according to their opinion, "there is no 'right' way to define evaluation, a way that, if it could be found, would put an end to argumentation about how evaluation is to proceed and what its purposes are". Such statements are not very helpful to non-professional evaluators. They contribute to the confusion and protect the field as a playground for the "good guys". Luckily several authors think a definition is important and can be provided.

In a recent and authoritative book, evaluation is defined in such a way that it comprises a whole programme cycle, from assessment of problems and needs to outcome or impact evaluation of social programmes (Rossi & Freeman, 1993). Here the definition of evaluation is:

> *Evaluation is the systematic application of social research procedures for assessing the conceptualisation, design, implementation, and utility of social intervention programmes.*

This definition includes any type of information gathering from the very start of a situation analysis to the final outcome of social programmes. It is a very broad definition, and beyond many people's understanding of evaluation. The assessment part of programme conceptualisation is a part of the evaluation. The authors' specific reference to social research procedures is, however, limiting, and one may accuse them of being biased in their theoretical orientation, evaluation procedures, selection of methodology and analytical approach. Other writers also see evaluation as an integrated part of programme planning and management, whether it is a training/education programme, a specific nutrition intervention, development activities, or education of the public (McMahon, Barton & Piot, 1980; Romiszowsky, 1984; Oshaug, 1992; Oshaug et al., 1993). For community nutrition, evaluation has been defined as follows (Oshaug, 1992):

> *The evaluation of a programme is a systematic collection and delineation and use of information to judge the correctness of the situation analysis, critically assess the resources and strategies selected, to provide feedback on the process of implementation and to measure the effectiveness and the impact of an action programme.*

This is also a broad definition, but it links the evaluation activities to a specific programme or activity. Here evaluation is seen as an essential management tool for all community nutrition activities, including nutrition education of the public. It includes a range of methodologies from medicine and social science to those specific to nutrition. All definitions stress the importance of planning the evaluation at the same time as the programme to be evaluated.

DEVELOPING AN EVALUATION SYSTEM

A common approach to evaluating an educational programme is what is often called a systematic approach (Oshaug et al., 1993; Rossi & Freeman, 1993). According to this approach, evaluation should be built into all phases of programme planning, implementation, and management.

Integrating evaluation into programme planning

Assessment of the situation can be considered as a part of an evaluation system (Rossi & Freeman, 1993). This might, however, create confusion by calling most of the activities in planning, evaluation activities. What is essential, however, is that evaluation begins with a clear definition of a nutrition education programme's goals and objectives.

Goals and objectives - linking programmes and evaluation

Goals and objectives of a nutrition education programme are based on nutritional needs. These are identified through assessment of the nutrition situation, based on, for example, an overview of regional or national plans for food and nutrition (if such exist); a profile of diseases and problems related to food and nutrition; the problems which can be solved by nutrition education; the factors that contribute to nutrition-related problems of all kinds and the level at which they operate (national, regional, local, household and individual); a description of the various actors and target groups; and a list of the systems that can support nutrition education activities (Oshaug, 1992).

Having this information, the goals and measurable objectives (including outcomes) can be specified. Goals and objectives for nutrition education programmes are all based on the assumption that there is room for improvement and that nutrition education is the right strategy to be used. Although a nutritional deficiency may be easy to recognise, a precise assessment of the empirical situation is usually required before planners can formulate specific, realistic objectives and design a nutrition education programme to achieve them.

Specification of goals and objectives is very important, both for an education programme itself, and for the evaluation. For the programme they give direction, expected results and time frames, and for the evaluation, criteria for measurements. Many programmes have suffered from poorly developed objectives, which also made evaluation difficult (Wholey, 1981; Chapman & Boothroyd, 1988; Oshaug et al., 1993).

Goals are generally broad, abstract, idealised statements about desired long-term expectations. For evaluation purposes, goals must lead to operationalisation of the desired outcome, that is, the condition to be dealt with must be specified in detail. These operationalised statements are referred to as objectives (Rossi & Freeman, 1993). Objectives must be formulated precisely, specifying expected outcome(s) and how, where, and under what conditions results will be achieved. For educational programmes the following elements of an objective are suggested (Oshaug, 1992):

An objective should contain:

- *the expected change - outcome* (e.g. behavioural, nutritional status);
- *the conditions* under which the expected change is to take place, including, for example, the geographical area, time, target group and activities used; and
- *the criterion*, or the extent of the expected change that will satisfy the objective.

It is important that the various objectives of an educational programme have different time perspectives[3]. In management literature one refers to "milestones", meaning specific objectives to be achieved at certain stages in the programme implementation. These are important because they can be followed and reported on during implementation.

For planning evaluation of Nutrition Education for the Public it is important to develop an evaluation system (see Figure 3).

Figure 3: Components in an evaluation system

• Context
• Input
• Process
• Outcome/impact

Context evaluation

Context evaluation ensures that past experience is brought into the process of planning. It focuses on the initial decisions in the nutrition education programme. Usually, most of the information needed has already been collected during the situation analysis, and/or a baseline study. If the available information is not sufficient, data from a sample or pilot programme, or anecdotal data may be collected to give better understanding of the problem. Context evaluation is normally carried out to refine objectives and activities, and ensure that they are realistic and relevant to the problems addressed in the nutrition education programme.

Context evaluation is also used to analyse contextual factors that may not have been directly addressed in the objectives but that have a bearing on implementation. These factors include the religion, race and ethnic background and sex of the target group in the community, and general socio-economic and political issues. Such an evaluation can focus on factors that may impede a programme, and thereby enabling staff to plan on coping with them (Oshaug, 1992).

[3] Short-lived interventions may produce measurable results, but new behaviours are fragile and can rapidly disappear. Education projects that have been evaluated over time strongly support the need for a long-term, intensive effort (ICN, 1992).

In nutrition education programmes it is essential for programme planners and implementors to understand how different target populations perceive reality, how they use and perceive symbols and colours (which may be used by the education programme), and how a nutrition education message would be received, understood and possibly acted upon by the target population.

Input evaluation[4]

Input evaluation of a nutrition education programme is an important part of the preparation for implementation of the programme. It takes a critical look at the adequacy and appropriateness of the resources available to carry out the programme. A programme can be said to have at least four types of input:

- the programme plan;
- the material resources;
- human resources such as programme staff; and
- time[5], particularly that allocated for the initial phase, evaluation, feedback, and follow-up.

At this point, the main concern is the quality of the inputs, that is, the likelihood that they will help or hinder the implementation of the programme. This can be done in various ways, but one can start by looking at the programme plan. Some of the activities planned may conflict, owing to conflicts between objectives, competition for scarce resources or other reasons. The following list gives examples of questions which may be useful (Oshaug, 1992):

- Are goals and objectives specified?
- Do they contain criteria?
- Are they based on a detailed situation analysis?
- Are they tested for relevance and feasibility?
- Are the activities tested for practicability and feasibility?
- Are the education materials tested for relevance?
- Have target groups been involved in any stage of programme conceptualisation and design?
- Does the programme staff have adequate skills and competence?
- Does the plan include feedback to the local community, the target group(s), authorities and others?
- Is cost per beneficiary estimated?

[4] Rossi and Freeman (1993) discuss fine-tuning established programmes, which is similar to the input evaluation discussed here, but basically focuses on ongoing established projects.

[5] Many evaluations of otherwise well-designed programmes show that programme planners consistently under-estimate time and effort needed to adopt a new practice (ICN, 1992).

When considering the answers to such questions, the consequence of the negative answers are important to assess. Will the gaps revealed prevent successful implementation? Should the programme be modified?

Process evaluation

Process evaluation is a tool for monitoring progress. It indicates, while the strategies and activities are implemented, whether they are likely to generate the expected results. Process evaluation should also indicate whether the work is done on time. If the activities do not meet expectations, they may be changed or even stopped. It is much better to change a programme during implementation than await a retrospective analysis to find out where it went wrong and who was responsible for the failure - when it is too late (Oshaug, 1992). Therefore, careful monitoring identifies programme constraints that have been overlooked or underestimated, provides insight into audience characteristics that were misunderstood, and suggests important factors that have changed during the course of the programme. Process evaluation provides programme planners with information to improve the design and management of the programme, and to strengthen future efforts (ICN, 1992). Process evaluation is important to understanding and interpreting outcome and impact findings.

The nature of the process evaluation depends on the problem and the programme involved. Some problems and programmes demand daily evaluation or immediate data collection, while others need only occasional checking. Several factors should be considered when planning a process evaluation, such as: objectives, target population, strategies and activities, scheduling, actors, and resources.

The objectives of the programme will spell out the outcome or short-term achievements (milestones) on the way to the goal. Well-formulated objectives are essential for process evaluation.

Because the completion of one activity may be a prerequisite for the start of another, it is essential to draw up a clear schedule for the programme. One programme can have several objectives with different schedules for achievement.

In addition, one should have a clear picture of all the programme staff and their responsibilities for initiating and implementing activities. Several questions about actors can be asked in process evaluation. For example, if an activity goes wrong, who or what is creating problems? Are the people involved in implementation acting as expected? What can be corrected and how can this be done?

Finally, the implementation of activities requires timely availability of resources. The use must be co-ordinated to avoid extra cost and maximise the benefits. Process evaluation can facilitate this.

When planning process evaluation, one needs to decide what indicators to use. This choice depends heavily on factors such as the nature and complexity of the programme, the criteria of the objectives, the context in which it is implemented, the people involved in the implementation, and the duration and target group of the programme.

Data collection for process evaluation

Process evaluation may focus on gradual changes in the target group (related to the specified objectives), and/or performance of programme personnel. Here I will focus on the last type of process evaluation. The complexity of the process evaluation will depend on the resources available and the expertise of the evaluator. As a rule, one should aim at data collection activities that are as simple and economical as possible. "High technology" monitoring and sophisticated quantitative analytical procedures are not always necessary for process evaluation. There are many sources of data that should be considered in the design of process evaluation of nutrition education programmes: direct observation by an evaluator, data from programme personnel, programme records, information from programme participants or their associates, and data on food use (in households) and/or sale (at markets, in shops).

Monitoring simple changes (use and sales of foods, or recording of implemented activities) may be straightforward, while collecting observational data can be more sensitive and complex. If the responsibility is given to an evaluator (external or internal), he or she can fill out regular reports, linked, for example, to milestones. This may simply include reporting on how separate activities were implemented. If process evaluation includes assessing demonstrations, information meetings, traditional theatre, etc., participant observation can be used. In such cases, uniform recording will be important. It may be useful to provide an observer with a list of important types of activities, attitudes, and behaviours of programme personnel. In nutrition training, attitude rating scales have been used (Oshaug et al., 1993). Such normative judgement is used to measure the clarity of an instructor's presentation and/or to assess the nature of the encounter between participants and the nutrition education programme activities (demonstrations, traditional theatre, information meetings, etc.).

Caution here is necessary. Direct observation methods appear attractively simple, but are not easily taught and learned. They are time consuming and can produce data that are difficult to summarise and analyse (Rossi & Freeman, 1993). The less structured the observation method and the more complex the nutrition education programme strategy, the more difficult it will be. Direct observation may also change the behaviour of programme personnel when the evaluator is present. It is advisable to combine direct observation with other types of process evaluation activities and use it to complement and facilitate the analysis and interpretation of other types of evaluation results.

Use of information from process evaluation

Process evaluation results have a number of uses, depending on the purpose of the evaluation, at what stage of development of the programme is, and the funding agency. An important function of process evaluation here, when it is a part of a comprehensive evaluation, is to provide information about the congruence between programme design and implementation. The results should therefore be fed back to project managers and staff on a continual basis. Discovery of fluctuations and changes over time may permit changes in the

programme or fine-tuning. A plan for use and dissemination of process evaluation[6] findings should be made when planning the evaluation system.

Outcome or impact evaluation

When evaluating the outcome of an intervention, a distinction must be made between *gross* and *net* outcome (see Figure 4) (Rossi & Freeman, 1993). The *gross outcome* consists of all observed changes in the period in question. The gross outcome measure in a nutrition education programme might be defined as any change in the diet of the participants compared to the diet before the programme started (the difference between pre- and post-programme values on selected measures).

The *net outcomes* are more difficult to measure. In assessment of net outcomes in a nutrition education programme, we try to measure for example the dietary changes which are caused by the intervention. In impact assessment we are primarily concerned with the net outcome.

Figure 4: Measuring outcome of a nutrition education programme

• Gross outcome: all changes in the period in question
• Net outcome: changes attributed only to the nutrition education programme

The dietary and nutritional changes seen in a specific period may be attributed to at least three effects:

- the effect of the intervention (net outcome of the nutrition education programme);
- the effects of extraneous confounding factors; and
- design effects, which are artefacts of the evaluation process itself.

Extraneous confounding effects

Observed, or lack of, associations may be due to a mixing of effects between the exposure, the outcome, and an extraneous factor. This is referred to as confounding (Rothman, 1986; Hennekens & Buring, 1987). For an extraneous factor to be a confounder, it must have an effect. That is, the factor must be predictive of the outcome. The effect need not be causal. Frequently only a correlate of a causal factor is identified as a confounding factor. A common example is social class, which itself is presumably causally related to few if any diseases, but is a correlate of many causes of disease. Similarly, some would claim that age, which is related to nearly every disease, is itself only an artificial marker of more fundamental biologic changes. In this view, age is not a causal risk factor, but nevertheless

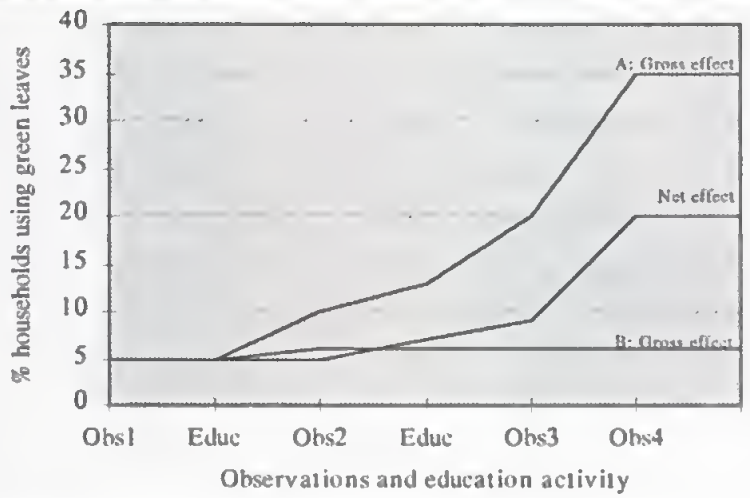
[6] This should be part of a plan for dissemination of all types of evaluation findings from all the different evaluation activities. It is important to present the findings in ways which correspond to the needs and competencies of the relevant stakeholders.

it is a potential confounding factor in many situations (Rothman, 1986). In order to control for confounding, a number of methods can be used, partly in design - including restriction in the admissibility criteria for subjects - and partly through stratified and multivariate analysis.

- Secular trends:

Relative long-term trends in a community - called *secular trends* - may produce changes in gross outcomes that enhance or mask the net effects of an intervention. Figure 5 shows a hypothetical example of an educational programme aimed at increasing the use of green leaves. A gradual economic improvement in a country may lead to increased consumption of the leaves, which earlier were consumed in small or insignificant amounts. Such low consumption may create nutritional deficiencies, in particular in the most disadvantaged groups. An economic improvement may therefore enhance the effect of a nutrition programme among poor people. A programme may therefore appear effective, measured by gross outcome, although it actually had much less net effect (situation A). Similarly, an effective programme to improve the nutritional situation of poor people may appear to have little or no effect assessed by gross outcome, because of a general downward nutritional trend, caused by economic recession, in the country (situation B). Such an economic recession may lead to a decrease in the consumption of foods, including green leaves, which were nutritionally important for the poorest segment of the community. In such a situation, a nutrition education programme may in reality have been effective and mitigated the nutritional problems by preventing a worse decrease in consumption of green leaves. The secular trends in situation A and B in Figure 5 were very different, but the net outcome was the same.

Figure 5: Theoretical examples of secular trends with confounding effects



A: Gross effect larger than net effect - positive secular trend.
B: Gross effect smaller than net effect - negative secular trend.

- Interfering events:

Like long-term secular trends, short-term interfering events, such as exposure to other types of educational material, can enhance or mask changes.[7] These interfering events are difficult to check. An earthquake that disrupts communications and hampers the delivery of food supplements may interfere with a nutrition programme. A threat of war may make it appear that a programme to enhance community co-operation, for example to establish food banks, has been effective, when in reality it is the potential crisis that has brought community members together (Rossi & Freeman, 1993).

- Design effects:

Design effects result from the evaluation process itself and are thus always present and consistently threaten the validity of impact evaluation. It is important to remember that the act of evaluation itself is an intervention, and thus may have an impact.

- Stochastic effects:

Chance-produced fluctuations - *stochastic effects* - in estimation of intervention effects based on empirical data, complicate the assessment of intervention effects. Assessing the role of chance consists of hypothesis testing, that is performing tests of statistical significance to determine the likelihood that sampling variability can explain the observed results, and estimation of confidence intervals to indicate the degree of precision of the measurement (Hennekens & Buring, 1987). Sample size should be large enough to permit stratified analysis without losing statistical power to such an extent that stratified analysis is impossible. Stochastic effects are only important if conclusions are dependent on statistical analysis.

- Measurement reliability:

A measurement is reliable to the extent that, in a given situation, it produces the same results repeatedly. The smaller the within-person variability, the better the reliability (Klaver et al., 1988; Burema, van Staveren & van den Brandt, 1988). Although all measurements are subject to reliability problems, they are so to varying degrees. Measurements of dietary intake, for instance, using recognised methods, are subject to less consistent measures from one data collection to another, than measurements of height and weight (Willett, 1990). The sources of unreliability lie both in the nature of the measurement, and the instruments used.

Nutrition education aims to change dietary intake or behaviour influencing nutrition. It is well recognised that the reliability of dietary intake measurement is weak (Beaton et al., 1979 and 1983, Cameron & van Staveren, 1988; Witschi, 1990; Barrett-Connor, 1991).

[7] A number of agencies, governmental and non-governmental organizations produce educational material for adults in nutrition, focusing on different aspects of nutrition and various target groups.

The reliability of intake measurement using food frequency questionnaires is higher than for the 24-hour diet recall. Part of this improvement is an artefact, because a food frequency questionnaire affords a limited number of options for types of food and portion size. This leads to less variability and higher reliability than a more open-ended method like 24-hour diet recall. Because reliability is in part a function of the precision of the data, differences between repeated recalls increases with decreasing simplicity of the question (Barrett-Connor, 1991). For example, reported consumption of green vegetables is expected to vary less from day to day than is consumption of one specific leafy vegetable. The effect of unreliability in measures is to dilute and obscure real differences. This problem is often referred to as "attenuation due to unreliability" (Rossi & Freeman, 1993). As with most of the possible extraneous confounding effects, weak measurement reliability leads towards null effect.

In evaluation, therefore, when assessing impact on diet, it is important to have a clear definition of the purpose of the assessment and thereby select appropriate methods and variables. Often a simple food frequency questionnaire may be good enough when looking at changes in food use. However, if food intake must be assessed, one would need personnel with a high level of skills to undertake a 24-hour recall, food history, instruct on food records, etc. This is particularly important in the analysis of the data, conclusions drawn and recommendations.

Bias or lack of internal validity[8]

The validity of a study is usually separated into two components, namely *internal validity* (the inferences drawn as they pertain to the actual subjects in the study), and *external validity* or generalisability (the validity of the inferences as they pertain to people outside the study population) (see Figure 6) (Rothman, 1986). Internal validity implies an accurate measurement of study subjects, apart from random errors. The internal validity is influenced by various types of biases. Bias at any stage of inference tends to produce results or conclusions that differ systematically from the truth (Sackett, 1979). Rothman (1986) proposes three general types: selection bias, information bias and confounding.

Figure 6: Bias or lack of internal validity

• Selection bias
• Information bias
• The Hawthorn effect
• Underlying factors (e.g. smoking)

[8] Validity is an expression of the degree to which a measurement measures what it purports to. Consequently, any systematic error of the measuring instrument affects the validity of the measurement (Klaver et al., 1988).

- Selection bias:

This type of bias results from the way subjects are selected for the study. The common element of such biases is that the relation between risk factors and outcome is different for those who participate and those who would theoretically be eligible for study, but do not participate (Greenland, 1977).

Uncontrolled selection is difficult to deal with. Even if some person or agency selects targets for participation, such selection is uncontrolled in the sense that the evaluator cannot materially influence who will or will not be a participant. If the participants in a programme are volunteers, a *self-selection bias* is inevitable. This type of bias presumably derives from an initiation process, that allows communities with special interest and motivation to be selected. Often they are more progressive, more affluent, or otherwise different from other communities in ways that affect outcome measures. Often, programmes based on the voluntary co-operation of individuals, households, or other units are most likely to be subject to processes leading to self-selection bias (Rossi & Freeman, 1993, Rothman, 1986).

In programmes where people are invited to participate, the problem of *self-referral* bias appears. Self-referral is normally considered a threat to validity, since reasons for self-referral may be associated with the outcome measures (Criqui, Austin and Barrett-Connor, 1979). Another source of selection bias derives from refusal, non-response or drop-outs among the target group (Hennekens & Buring, 1987). Subjects who leave a programme may be different from those who remain. The consequence is often that those who stay with a programme to its end are those who may have needed the programme least and were most likely to have changed on their own (Wilhelmsen et al., 1976; Rossi & Freeman, 1993).

- Information bias:

Information (or observation) bias results from systematic differences in the way data used for classification of subjects are obtained. The consequences of the bias are different depending on whether the classification error is non-random (dependent on another variable, either exposure or outcome) or random (independent of another variable). The existence of classification errors that are not independent of another variable is referred to as *differential misclassification*, whereas the existence of classification errors for either exposure or outcome that are independent of the other, is considered *nondifferential misclassification* (Rothman, 1986).

The most serious problem is the differential non-random misclassification. The effect can be biased in the direction of producing either an over-estimation or under-estimation of the true association. When people are interviewed about dietary intake they tend to reply according to what they consider is healthy, or give the answer they think the interviewer wants. If, for example, a person in a control group is consistently under-reporting her/his food intake because he or she wants to be a beneficiary of a nutrition intervention programme, he or she may be wrongly classified into a group with low energy intake, or

low access to food. This differential misclassification may overestimate the effect of a programme. A similar situation may occur in communities where birth certificates are not in use. Consistent under-reporting of children's ages will lead to non-random or differential misclassification, producing an under-estimation of the true level of child malnutrition in a community (Oshaug et al., 1994). Unfortunately, it is often very difficult to estimate the precise effect of differential misclassification (Hennekens & Buring, 1987).

Non-differential or random misclassification has generally been considered a lesser threat to validity than differential misclassification, since the bias introduced by non-differential misclassification always leads towards the null condition (Copeland, Checkoway & McMichael, 1977; Hennekens & Buring, 1987; Rothman, 1986). In impact evaluation using variables on dietary intake as determinants in the analysis, non-differential misclassification creates substantial problems. The deficiency states for essential nutrients are comparatively easy to classify. This is, however, different from most issues confronting nutrition evaluators dealing with non-communicable diseases, which are now rapidly increasing in poor countries all over the world (ICN, 1992a; ICN, 1992b; Marmot, 1992).

The problem of misclassification varies for different determinants, with diet possibly as the most difficult. Firstly, a major problem leading to non-differential misclassification is the lack of valid practical methods to measure the usual dietary intake. Thus, a 24-hour diet recall cannot be used to identify individuals whose intakes are consistently high or low (Dwyer, 1988), except perhaps in communities where dietary patterns are extremely monotonous. In a developing country setting, it is often even more difficult to get valid and reliable dietary intake data. In order to improve the validity and reliability, combined methods are therefore often used (Bingham et al., 1988). Secondly, with few exceptions, all individuals are exposed to hypothesised causal dietary factors such as fat, vitamins, the vitamins A and C and other antioxidants, and non-nutrients including those of toxic nature. The exposure cannot be characterised as present or absent, but rather as a continuum from low to high. In periods, the exposure for the same individual might be high or low (like high intake of fruits and vegetables in seasons of high availability, but low intake of the same foods during off-season). This makes it difficult to classify a person as having a consistently high or low nutrient intake, and non-differential misclassification can easily occur. When an effect exists, bias from non-differential misclassification of exposure is always in the direction of the null value (Rothman, 1986).

- The Hawthorn effect

An intervention programme will often create an effect no matter what the programme is about. In experiments involving pharmacological treatments, it is known as the "placebo effect", and in social programmes like nutrition education for the public, as the "Hawthorn effect" (Rossi & Freeman, 1993). The Hawthorn effect refers to a study conducted in the 1930s, showing that any change in the working environment brings about a rise in worker productivity. It is argued that the Hawthorn effect is not specific to any particular research or evaluation design. It may be present in any study involving human subjects. In other words any nutrition education programme can bring about dietary changes, no matter what

the message is. It is difficult to estimate the importance of the Hawthorn effect, and some argue that one may easily exaggerate its importance (Franke & Kaul, 1978).

- Underlying factors influencing diet

Today there are changes that takes place in poor and rich countries which have an impact on nutrition and are sometimes so serious that they can create social unrest (Strasser, Damrosch & Gains, 1991; Wiecha, Dwyer & Dunn-Strohecker, 1991; Stitt, Griffiths & Grant, 1992; Chen, Kleinman & Ware, 1994; Forman, 1994; Golden & Baranov, 1994). People migrate frequently within and between countries, leading to unstable, or the establishment of different, social networks (Pedersen, 1995). As unemployment increases, social relations change, leading to a decrease in lasting family relations, and an increase in re-establishment of relations with other adults (new friends, marriage or co-habitation). Such societal and contextual changes may have positive or negative nutrition implications (McConaghy, 1989; Oshaug, 1994; Pedersen, 1995).

One concrete example is the change in smoking habits throughout the world. Smoking is presently decreasing in rich countries and increasing in poor countries (Barry, 1991; Gray, 1992; Samet, 1993; Mackay, 1994). A number of studies have demonstrated that smokers eat differently from non-smokers. The pattern is similar among men and women of various ages, and in different countries (Kato, Tominaga & Suzuki, 1989; Pamuk et al., 1992; Suyama & Itoh, 1992; Zheng et al., 1993). It is suggested that smoking acts both as a causal factor and as a marker of unhealthy life style (Castelli, 1990; Morabia & Wynder, 1990; Whichelow, Erzinclioglu & Cox, 1991; Hulshof et al., 1992; Perkins, 1992; Strickland, Graves & Lando, 1992; Midgette, Baron & Rohan, 1993). It may be argued that smokers purchase different foods compared to non-smokers because cigarettes are relatively expensive and so compete with food expenditures. If food access were the same, one might assume that there would be no difference in dietary intake. It turns out, however, that in a situation where smokers and non-smokers have the same food access, the smokers have a more unhealthy diet than non-smokers (Oshaug et al., 1995). The changing pattern of smoking will therefore affect people's food habits in particular in urban areas, and thus their nutrition situation (Harpham & Stephens, 1991). This shows that controlling for smoking is important in any evaluation which compares dietary intake in different groups exposed to nutrition education.

Who should evaluate?

In deciding who should perform the evaluation, the first distinction to be made is between internal and external evaluators. An internal evaluator is usually a part of the programme concerned and reports directly to its managers. The internal evaluator's objectivity and external credibility are (often rightly) said to be lower than those of an external evaluator. Because external evaluators are not directly involved or employed in the programmes they examine, they enjoy more independence (Oshaug, 1992), but they may be less discerning about context.

The second distinction is between what can be called professional and amateur evaluators. This distinction reflects differences in training and expertise, not a value judgement of the quality of an evaluation. Evaluation is the focus of the professional evaluator's training and work. The professional training of an amateur evaluator, however, usually focuses on other topics, and evaluation is only a part of her or his job.

The amateur is normally less skilled in evaluation than the professional. Nevertheless, the former might have a better understanding of a programme's evaluation needs, be able to develop better rapport with the staff and will be able to use the information and results of the evaluation faster (often directly), in particular if it is an internal evaluation (Oshaug, 1992).

QUALITATIVE VERSUS QUANTITATIVE METHODOLOGIES

The discussion so far has basically focused on quantitative evaluation. While impact or outcome evaluation is often quantitative, process evaluation and monitoring also use qualitative information. The relative advantages and disadvantages have been debated extensively in the evaluation literature (Rossi & Freeman, 1993). In the 1970s and early 1980s quantitative evaluation, was heavily criticised (Cook & Reichardt, 1979; Patton, 1980; Lincoln & Guba, 1985). Patton (1978) writes:

> *"Evaluation research is dominated by the largely unquestioned, natural science paradigm of hypothetico-deductive methodology. This dominant paradigm assumes quantitative measurement, experimental design, and multivariate, parametric statistical analysis to be the epitome of "good" science... By way of contrast, the alternative to the dominant hypothetico-deductive paradigm is derived from the tradition of anthropological field studies. Using the techniques of in-depth, open-ended interviewing and personal observation, the alternative paradigm relies on qualitative data, holistic analysis, and detailed description derived from close contact with the targets of study. The hypothetico-deductive, natural science paradigm aims at prediction of social phenomena; the holistic-inductive, anthropological paradigm aims at understanding of social phenomena."*

Patton agrees, however, that from a utilisation-focused perspective on evaluation, neither of these paradigms is intrinsically better than the other. They represent alternatives from which the evaluator can choose (Patton, 1978). Today the hypothetico-deductive paradigm is not seen in such a negative light. A statistical analysis is not limited to parametric analysis and most evaluators will collect both qualitative as well as quantitative information. As pointed out by Rossi and Freeman (1993), qualitative evaluators often tend to be oriented toward making a programme work better by feeding information on the programme to its managers (formative evaluation). In contrast, quantitatively-oriented evaluators view the field as one primarily concerned with impact or outcome evaluation (summative evaluation). The polemics against or for pure qualitative or quantitative evaluation obscure the critical point - namely, that each approach is useful, and the choice of approaches depends on the evaluation question at hand. Rossi and Freeman (1993) point out that qualitative approaches can play critical roles in programme design and are important

means of monitoring programmes (process evaluation). In contrast, quantitative approaches are much more appropriate in estimates of net impact, as well as in assessments of the efficiency of programme efforts.

However, qualitative procedures are difficult and expensive to use if the evaluation depends entirely on this. For example, it would be very difficult and expensive (Rossi & Freeman say that it would be virtually impossible) to build on qualitative observation in large-scale surveys.

The critical issue is thus fitting the approach to the purpose of the evaluation. The use of both qualitative and quantitative, and multiple methods,[9] can strengthen the validity of findings, if results produced by different methods are congruent and/or complement each other[10] (see Figure 7).

Figure 7: The use of qualitative vs. quantitative methodologies in evaluation

• Both types of methodologies are important
• Qualitative methodologies are useful in monitoring and process evaluation
• Outcome/impact evaluation is often quantitative
• Use of both types of methodologies strengthen validity of findings

MEASURING EFFICIENCY

The procedures employed in efficiency assessment (cost-benefit and cost-effectiveness) are often highly technical, and the analysis is based on numerous assumptions (Sønbø Kristiansen, Eggen & Thelle, 1991; Rossi & Freeman, 1993). Nutrition education for the public aiming at changing behaviour has to compete with other programmes for resources. Policy makers and funding agencies (government agencies, United Nation agencies and NGOs) must decide on how to allocate funding among these various programmes. In this competition a central question is: which programmes would show the biggest payoffs per money unit of expenditure?

For decision makers the reference programme is often the one that produces the most impact on the most targets for a given level of expenditure. This simple principle is the foundation for cost-benefit and cost-effectiveness analyses. These analyses provide

[9] Often referred to as "triangulation" (Green & McClintock, 1985).

[10] Congruence here means similarity, consistency, or convergence of results, whereas complementarity refers to one set of results enriching, expanding upon, clarifying, or illustrating the other. Thus, the essence of the triangulation logic is that the methods represent independent assessments of the same phenomenon and contain offsetting kinds of bias and measurement error (Green & McClintock, 1985).

systematic approaches to resource allocation. From a conceptual point of view, perhaps the most significant value of efficiency analysis is that it forces evaluators and programme personnel to think in a disciplined fashion about both costs and benefits (Rossi & Freeman, 1993).

In *cost-benefit analyses* the outcomes of nutrition education programmes are expressed in monetary terms:

For example a cost-benefit analysis would focus on the difference between money expended on the nutrition education programme and the money savings from reduced expenditure for treating dietary-related diseases (anaemia, goitre, vitamin A related blindness, etc.), loss of productive capacity, life years gained, quality of life years saved, etc.

In *cost-effectiveness analyses* the outcome for nutrition education programmes is expressed in substantive terms:

For example a cost-effectiveness analysis of the same nutrition education programme as above would focus on the estimation of money expended to change the diet of each target.

Efficiency analysis can be done either in the planning or design phases of a programme. It is then called *ex ante* analysis. Ex ante analyses are not based on empirical information, and therefore run the risk of either under- or over-estimating the benefits of effectiveness. Most commonly, efficiency analyses of programmes take place after their completion, often as part of their impact evaluation. This is called *ex post* analysis where the purpose is to assess whether the costs of the intervention can be justified by the magnitude of net outcomes (Rossi & Freeman, 1993). An important strategy in efficiency analysis is to undertake several different analyses of the same programme, varying the assumptions made which are open for review and checking. This is called *sensitivity analysis*.

Cost-benefit analysis is controversial because only a portion of programme inputs and outcomes may reasonably be assigned a monetary value. One must ultimately place a value on human life in order to fully monetise the programme benefits (Zeckhauser, 1975; Sønbø Kristiansen, Eggen & Thelle, 1992; Rossi & Freeman, 1993). Efficiency analysis may be impractical and unwise for several reasons (Rossi & Freeman, 1993):

- The required technical procedures may be beyond the resources of the evaluation programme.
- Political or moral controversies may result from placing economic values on particular input and outcome measures. This may obscure the relevance and minimise the potential utility of an evaluation.
- Efficiency assessment may require taking different costs and outcomes into account, depending on the perspectives and values of sponsors, stakeholders,[11] targets and

[11] Stakeholders are individuals or organizations directly or indirectly affected by the implementation and results of interventions programmes (Rossi & Freeman, 1993).

evaluators themselves. This may be difficult for at least some of the stakeholders to understand, and may obscure the relevance and utility of evaluations.

- In some cases, the data needed for undertaking cost-benefit calculations are not fully available. The analytic and conceptual models may be inadequate, and often untested underlying assumptions may lead to faulty, questionable and unreliable results.

There are therefore considerable controversies about converting outcomes into monetary values. Cost-effectiveness analysis is seen as a more appropriate technique than cost-benefit analysis (Rossi & Freeman, 1993). Cost-effectiveness analysis requires monetising only the programme's cost, and the benefits are expressed in outcome units.

SKILLS NEEDED IN EVALUATION

To identify one specific skill profile for nutrition evaluators would be impossible. Nutrition is a field which is cross- or inter-disciplinary in nature. Similarly, evaluation is a cross-disciplinary undertaking, where borrowing of methodologies from many disciplines has been extensive. Evaluation is not a "profession", at least in terms of the criteria that are often used to characterise nutritionists, physicians, sociologists, agronomists and other groups. Evaluators use a range of approaches, such as large-scale, randomised field experiments, time-series analysis, qualitative field methods, quantitative cross-sectional studies, rapid appraisal methods, focused group discussions, and participant observation. The role definition of an evaluator in general terms is therefore blurred and fuzzy (Rossi & Freeman, 1993).

Clearly it is impossible for every person involved in evaluating nutrition education of the public to be a scholar in all relevant sciences and disciplines, and to be an expert in every methodological procedure. In evaluation of nutrition education programmes, it is therefore important to be open to hiring consultants who are experts in methods the evaluators themselves cannot cover.

Instead of attempting to make an extensive list of the skills needed, we can consider some examples linked to the various types of evaluation discussed above.

An evaluator has an important role in assessing the correctness of problem identification (context evaluation). Skills are therefore needed in diagnostic procedures for defining the nature, size, and distribution of the nutrition problem. This may include analysis of existing data to assess or provide a baseline, rapid appraisals, qualitative needs assessment, forecasting needs, estimating nutrition paramcters, estimating nutrition/disease-risk behaviours, and assessing the selection of targets (incidence/prevalence measurements, identification of population at risk, etc.). Several of these skills are also relevant in process and outcome evaluation. Furthermore, skills are also needed in using indicators to identify trends, measure programme coverage, identify effects and impact, assess biases and confounding factors, and disseminate evaluation results to various stakeholders.

CONCLUDING REMARKS

Evaluation theory, research design topology, and methodology, are discussed in many books which can be recommended for further reading (Levin et al., 1981; Rossi, Wright & Anderson, 1983; Shadish, Cook & Leviton, 1991; Rossi & Freeman, 1993). Evaluation can be simple or complex. The methods chosen depend on the evaluator's competence and the aims of the evaluation. Experimental and quasi-experimental designs have often been discussed, but such rigorous designs have been criticised. In evaluating nutrition education programmes, one should feel free to look at various options, aiming at the simplest system that works, and seeking the best method or set of methods for answering the questions that address the objectives of the evaluation. Having chosen a type of evaluation and the questions and indicators to use, one will be better able to decide between the use of, for example, quantitative or qualitative methods, questionnaires, guides, general interviews, focused groups, key informant interviews, and participant observation (Oshaug, 1992).

RECOMMENDATIONS

(i) Integrate evaluation in the programme from the planning phase.

(ii) Clarify the purpose of the evaluation.

(iii) Develop an evaluation system which takes account of all phases of the nutrition education project.

(iv) Decide if the evaluation should be internal or external, or both.

(v) When evaluating inputs, make sure that programme objectives are properly specified and that they contain criteria, and that the activities are relevant and feasible.

(vi) When evaluating impact of nutrition education on diet, use combined dietary assessment methods in order to improve validity.

(vii) Use multiple methods (triangulation) in data collection and analyses. This will strengthen the validity of findings if the results produced by different methods are congruent.

(viii) In analyses, be careful to control for extraneous confounding factors and bias.

(ix) In efficiency analyses, select a cost-effectiveness analysis rather than a cost-benefit analysis because it is more appropriate for nutrition education programmes.

(x) In internal evaluation, assess the competence of the evaluator(s) needed for the evaluation. Be open to hiring consultants who are experts in methods not available in the programme, or for training of programme personnel.

(xi) Evaluation should be part of further training for nutrition personnel, and training in evaluation methodology should be provided for programme personnel.

(xii) Resources for evaluation should be specified in the general budget for nutrition education programmes.

(xiii) Adequate time should be allocated to nutrition education programmes, with the timing of the evaluation clearly identified.

(xiv) Make a plan for dissemination of the evaluation results and ensure that they are presented in ways which correspond to the needs and competencies of the relevant stakeholders.

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New developments in nutrition education utilising computer technology

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INTRODUCTION

In developed and developing countries, many projects have demonstrated that enhanced communication efforts can improve the health and well-being of populations. More recently communication technologies have emerged as a viable means of both gathering and disseminating nutrition information. Interactive computer-mediated communication incorporates stand-alone computer applications or software, multimedia applications, on-line services, and interactive television. These services are used to inform and influence the public for a wide variety of reasons. This paper will highlight the opportunities that new technologies provide for nutrition educators; describe computer-mediated services used for nutrition education; list issues important to nutrition educators; and explore opportunities for expanded uses of nutrition education programmes utilising computer technology in both developing and developed countries. The last significant review of the use of computers in nutrition education was prepared in 1984 (Shannon, 1984).

Computer communications can be grouped under two headings, stand-alone applications and on-line applications. Stand-alone applications are computer programmes that run without connection to telephone, television, satellite, or other electronic transmissions. These applications have received the greatest use in nutrition education to date. The use of linkage-applications, through electronic mail (e-mail), Internet, and world wide web (WWW), in nutrition education is just emerging.

The area of emerging communication technologies is filled with new terminology. A glossary of terms is provided at the end of the paper.

STAND-ALONE APPLICATIONS

Stand-alone applications have been designed to provide information and training in nutrition education for the public, the paraprofessional, and the professional. Programmes are available on floppy disks, CD-ROM disks, and laser disks with accompanying floppy disks.

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Programmes are being used at computer work stations or at kiosks. A comprehensive list of nutrition software is not currently available. The Food and Nutrition Information Centre (FNIC) of the United States Department of Agriculture (USDA) maintains the largest listing, about 200 programmes, of food and nutrition software. The list represents about half of the food and nutrition applications available in North America. Lists of programmes are available by writing or e-mailing a request to the library.

The major types of programmes designed both for professionals and consumers include nutrient analysis, food service and recipe management, menu planning, clinical nutrition, drug-nutrient interaction, health-risk assessment and lifestyle prescription, food and nutrition education, and games. In addition to programmes designed specifically for food and nutrition education, there are general production tools such as graphics packages, computer photo and clip art collections, and presentation software, that are used by nutrition educators to enhance the production, adaptation, and dissemination of nutrition education materials.

The programmes described in this section are for illustrative purposes. Other programmes are available, but those described are most familiar to this author and are predominantly from North America. Their inclusion does not imply endorsement.

Nutrient analysis

Based on food intake recalls/records

During the 1980s and 1990s, software to analyse food intake proliferated. A list of foods and beverages, along with the serving sizes, for one or more days is keyed into the computer programme. The programme calculates the nutrient intake of individuals or groups of individuals and compares it to a nutrient standard. A personal nutrient profile is created, usually with a printout. Most applications require keyboard entry, but researchers interested in expanding the consumer reach of these programmes have successfully demonstrated that consumers of a wide range of socio-economic and educational levels can use a touch-screen computer system for diet analysis.

Several authors have described considerations for selecting a computerised dietary analysis system (Buzzard, Price & Warren, 1991; Seaman, 1992; Nieman et al., 1992; LaComb, Taylor & Noble, 1992; Lee, Nieman & Rainwater, 1995). The nutrient database is the most important feature. The database must be accurate, verified, and large enough to meet the intended task. Most programmes use the USDA nutrient database as the standard. Some programmes augment the USDA database with information from commercial sources and allow the addition of more foods or ingredients. Nutrient adequacy is usually defined by the U.S. Recommended Dietary Allowances. Some programmes use other standards, including the Recommended Dietary Intake for Canadians, the U.S. Food and Drug Administration (FDA) labelling standards (Recommended Daily Intake or RDI and Daily Values or DV), Food Guide Pyramid servings, and other food grouping systems. A few software vendors customise programmes with international standards and foods. Computerised databases for food consumption information are available from FAO as well as other international organisations and country food and nutrition institutes. The International Network of Food Data Systems (INFOODS) has food composition databases organised for regions of the world.

Matching the education or research needs with the programme is important, because prices vary from less than US $5 to several US $1,000. Hardware requirements also increase as the complexity of the programmes increases. The cost is based on the number of foods in the database, number of nutritive components analysed, and programme capabilities, such as types of reports generated (e.g. lists, graphs, summaries, dietary advice), and availability of updates and technical support. Generally, programmes are distributed on multiple floppy disks or CD-ROM disks.

Programmes that analyse nutrient intake were welcomed by researchers and hospital dieticians. They found computerised nutrient analysis significantly reduced both the time and effort of calculating intakes using calculators and food composition books. The programmes have now been used extensively for classroom assignments from elementary through to medical school students, and have been offered as a nutrition education service in shopping malls and health fairs, in science exhibits, and by public health and co-operative extension service professionals, fitness trainers, food scientists and food service professionals. The programmes are used in doctors' clinics as part of medical assessments or nutrition counselling sessions.

Programmes have also been developed for the home computer market. The popularity of these diet analysis programmes continues to grow as consumers become aware of the relationships between food intake and health and want to tailor their own dietary intake (e.g. to be lower/higher in calories or fat). Multimedia programmes, such as "Pyramid Challenge" (Dennison, 1995) combining video, slides, graphics, voice, and text with the interaction of computers, are expected to expand the use of nutrient analysis in nutrition education programmes.

The effectiveness of these programmes for computing nutrient intake for research and education purposes, identifying nutrient excesses and deficiencies, and teaching food composition to varied audiences is well documented. The speed of calculation has allowed nutrient analysis to be used more frequently in education and counselling settings.

Nutrient analysis based on food frequency questionnaires (FFQs)

The FFQ is a short-cut method for collecting information about dietary intake. First, a computerised software made it possible to easily estimate reliable nutrient intakes. But the questionnaire remained difficult to self-administer because keyboard entry was required. Then, a software was developed to ease data collection. In the mid-1980s, Jacobson (1984) demonstrated that clients in public health clinics would use a computer touch screen to report their food intake. The FFQ was presented on a computer screen and the computer was programmed to calculate the nutrient intake. The expensive price of the hardware prohibited the wide-scale adoption of this method, even though staff who interviewed clients about food intake were freed to spend more time on counselling. Hardware has become more affordable and others have demonstrated the cost effectiveness and feasibility of this method (Suitor & Gardner,1992; Byron, 1995). More recently, the growing availability of multimedia hardware has made it possible to programme a FFQ to be user friendly for a wider audience, including those with low literacy skills.

"Nutrition DISCovery", delivered on CD-ROM, (Interactive Design and Development, 1995) is one example. This programme uses storytelling, sound, video, and other aids to

personalise the questionnaire and reduce the tedium and reading ability needed to complete the data input of traditional FFQs. "Nutrition DISCovery" is based on the Health Habits and History Questionnaire, Dietary Analysis System, National Cancer Institute (Block, 1989). Food items are organised within categories similar to the aisles of a supermarket. Introductory screens to each food category include both an audio prompt and a short video clip to remind the user of a variety of foods and eating occasions. Rather than selecting from a list of foods, the user identifies the foods eaten from 100 colour food items shown on the screen. The user is asked the quantity and frequency of only those foods selected. Answers are entered using a mouse. Audio and visual cues allow non-readers to use the programme successfully. The user can look at the results on screen or receive a printout. For example, a screen of the USDA Food Guide Pyramid shows the user the number of servings reported and the number recommended for his or her age group. Educational statements are generated for users with high fat or high sodium intake and for those who exceed their healthy weight by 15+%. The storage capacity of the CD-ROM allowed the developer to include a nutrition education section with games, quizzes on knowledge, and immediate feedback. An important advance in "Nutrition DISCovery" is that, in addition to estimating the nutrients in an individual's long-term, usual, self-selected diet, it reports to the user the number of servings from the USDA Pyramid. While this programme is currently only in English, it is feasible to have additional languages made available to the user.

The effectiveness of this type of programme for collecting nutrient information and changing behaviour of users is under study (Sumner, Keller & Diamond, 1996). The multimedia application is expected to engage the user effectively and result in a higher percentage of completed questionnaires from people of all reading levels. It is expected that multimedia programmes, when compared with pencil and paper or partially automated questionnaires, will result in more reliable data because serving sizes are represented better. The programme also allows collection of dietary data when the expert interviewer is unavailable or unaffordable.

Other nutrient database applications (e.g. food service and recipe management, menu planning)

Computer software for hospital, school food service, and other food service or institutional applications are outside the scope of this paper. Basic software programmes used for nutrient analysis are used for these functions. Additional functions generate nutrient analysis, costing and quantity conversions of recipes, food production reports, inventory listing, and purchasing.

One example of a consumer version of menu-planning multimedia software, delivered on floppy disk, is "Ready, Set, Dinner" (U.S. National Potato Board, 1994). This software was developed for use in a communication programme designed to increase the consumption of fresh potatoes. Multimedia menu-planning software allows the user to easily search a library of 40 recipes, create menus and shopping lists, find nutrition information, and use graphics, music and animation. Several outlets were used to publicise the programme. The software was promoted (i) in newsletters sent to working mothers, (ii) during a satellite media tour of a popular junior high school television celebrity, (iii) to food, health and computer news editors, and (iv) by placing it in grocery stores in a kiosk at point-of-purchase, near the potato display, with recipe cards and information on how to obtain the software distributed in the kiosk; (v) on Internet where the programme is available for downloading; and (vi) in print advertisements.

Evaluation of the effectiveness of this programme to increase sales and consumption of potatoes is in progress. Retailers participating in the kiosk trial reported potato sales increased by 5-20%. In the first six months, as estimated, 30 million Americans were exposed to the message and 17,000 copies of the software were distributed. Testimonials from consumers suggest that this software is engaging enough to use, takes the tedium out of menu planning, and encourages parent-child interaction about nutrition. Nutritionists suggest that this type of programme may help individuals follow dietary guidelines. The programme demonstrates a benefit of computer applications: providing information when and where the public wants it.

Clinical nutrition

There are a limited number of computer programmes for assessing the nutritional status of patients; charting medical records; teaching patients about diet and disease; growth monitoring (Anon, 1986) and for computer-assisted education and continuing education for health and medical professionals.

Assessment tools

Applications that use computer capabilities in calculations and data management are widely available. Software for desktop computers and programmes for hand-held computers are useful for many formulas used in nutrition assessment, including basal metabolic energy needs, Body Mass Index (BMI), desirable body weight, nitrogen and diabetic food exchanges. Adjustments can be made based on a variety of parameters. These tools are useful in hospital and community research and service settings. They allow for the use of more precise calculations, rather than rule of thumb calculations, with fewer errors in making decisions about nutrition care. These tools can be less cumbersome than manuals.

An example of a health information system software is "ProMis". It is a tool to manage large amounts of data like severity of malnutrition or diarrhoea. Save the Children used the system to rectify discrepancies in food rationing (Hendricks, 1995). There is a potential to build nutrition education systems into these data systems.

Nutrient-drug interaction

Nutrient-drug interaction software is an example of a specialised database for clinical nutrition. It allows the user to quickly assess any nutrients that may be compromised with a medication regimen. These aids make it more likely that interactions will be considered when prescribing medicines.

Patient education

Programmes to provide dietary information and education to patients are available for individuals with diabetes, hypertension, heart disease, and complex medication regimens. These programmes teach patients about causes of the disease, symptoms, complications, dietary management and menu planning. The levels of personalisation and interactivity vary greatly.

Of particular interest is the "TouchVideo for WIC", developed to meet the need to provide consistent nutrition education with limited professional nutrition staff. Six modules were designed for delivery on an interactive video disk kiosk. Information on breast-feeding, healthy eating habits, shopping, smoking cessation, an introduction to the WIC programme and an eligibility screening tool, have been successfully used with about 55% of the case-load for the state of Maine, USA. Multiple media are used in many modules, from full-motion video to straight text. Almost all clients reported positive feelings about using the programme to learn. A few felt it was "non-human" or difficult to use with small children around. No one reported being intimidated by the computer. Knowledge gains and positive attitudinal shifts have been reported (Byron, 1995). Most clients favoured a combination of a live counsellor and computer. These programmes and additional modules are being converted to CD-ROM to expand distribution possibilities.

The value of the programmes has been demonstrated in the following ways: delivering consistent and concise nutrition and health counselling, even when a professional nutritionist is not available; engaging clients for a longer period of time because the programme is interactive; creating more time for critical one-to-one counselling; and crossing cultural and language barriers. Some users preferred the computer interview to an interview with a health care professional. This application also demonstrates an important advantage of computer information and education: it consistently provides standard answers to predictable questions. Other advantages are that it is non-judgmental, it affords privacy in learning and it assures equality of information to the user. Nutrition workers sometimes fear they will be replaced. Training of nutrition workers to use these technologies to enhance their work is needed.

Computer-assisted instruction for health professionals

Although this paper focuses on the use of technology for consumer nutrition, education applications are available for the nutrition education of students, paraprofessionals and professionals. Often these programmes, or portions of these programmes, can be adapted for consumer use. The nutrition programmes available generally include content such as the relationship of diet to a disease, components of nutritional assessment, diet history methods, and patient case studies. These programmes vary from computer-text-on-screen to computer-based multimedia applications. Users have found text-on-screen applications valuable for the immediate feedback provided by drills and quizzes.

- Text-on-screen examples:

"Nutrition and the Practising Physician" (Schoenberger, Betz & Mascitti, 1994) is an example of a computer-assisted instruction programme that addresses both the prevention and management of diseases including obesity, hypertension, diabetes, and lipid disorders. The programme provides nutrition information and counselling strategies known to foster a positive physician/patient relationship. Each module takes about 45 minutes to complete. The user's knowledge is tested and compared to professional standards. Case studies are presented and the users answer multiple choice questions about case management. This type of computer-assisted instruction (CAI) takes advantage of learning theories involving reinforcement of learning experiences, the advantages of self-paced learning, and repetition of difficult material. The Health Sciences Consortium has created an authoring template to assist subject matter experts in

writing computer-based cases. A series, including nutrition and diabetes (Kolasa, Lasswell, & Lasswell, 1995), is in production. "Nutrition and Disease Prevention", a computer-assisted training and continuing education programme, was designed for health care in developing countries (National Capitol Systems Inc, 1984).

- Multimedia examples:

Multimedia programmes for health professionals and students are promoted as ways to increase learning and retention in a shortened learning time, captivate students, and provide realism, role modelling and simulations. Many programmes requiring a computer and a laser disk were developed for nursing and medical education (O'Neill, 1990). Until recently, videodisk technology was required to show realistic video on a computer.

One of the few nutrition interactive videodisk programmes produced is "Cardiovascular Health: Focus on Nutrition, Fitness and Smoking Cessation" (Kolasa & Jobe, 1994). The technology is used for role modelling. Physicians are seen completing nutrition assessments and counselling their patients in ambulatory clinics. Users chart their own path through the programme. Self-assessment tools give users immediate feedback about their own diet and exercise pattern. The programme tests users' ability with simulated cases. As a final test, users complete a clinical challenge by reading a patient's chart, providing nutrition assessment, and prescribing a management plan. The computer tracks the users' paths and performance. Instructors can check the users' performance. The programme was evaluated by medical students (Kolasa et al., 1995). Users' acceptance of multimedia education depended on their learning style and interest in nutrition. Users liked actually seeing physicians in the patient-care setting. This programme demonstrates the ability of computer multimedia programmes to: (i) effectively model nutrition assessment and counselling behaviours; (ii) ensure consistency and equality of learning opportunities; and (iii) expose learners to master teachers and subject matter experts. Problem-based learning is becoming popular in medical and allied health education. *Images of Cancer Prevention, The Nutrition Cancer Link* (Kolasa, Jobe & Miller, 1995) demonstrates using the computer to replace, in part, the group's tutor. This is useful if subject-matter experts are scarce. A medical nutrition curriculum to be used by first year medical students as part of their basic science course is being developed at the University of North Carolina, Chapel Hill.

Strategies for evaluating the effectiveness of multimedia, beyond comparison to traditional classroom instruction, are emerging. Initially students taking multimedia and those taking traditional lecture courses test similarly. Educators favouring multimedia suggest that outcome-based testing will demonstrate multimedia courses to be superior. In the meantime, since the cost of developing these programmes is high, some educators wonder if the use will become widespread. Whether computer-based instruction in developed and/or developing countries will maximise learning for the dollars spent is being debated (Reeves, Harmon & Jones, 1993; Reeves, 1992).

- Applications to distance learning:

CAI is a distance learning approach. Programmes that provide performance feedback and coaching have demonstrated improved learning in distance education and training situations. Computer-based case studies teach the learner nutrition assessment practices, perform assessment

tasks, and interpret results. Simulated experiences allow users to practice. Users can uncover new information as they progress through case studies or realistic simulations. Specific and important findings can be highlighted. Although CAI cannot replace many clinical or nutrition education experiences, it can help build and maintain cognitive and analytic skills in an interactive format. Some other advantages are: (i) cases can be staged to challenge both the novice and the expert; and (ii) content can be indexed for easy access to any term, image, or sound. This approach may be very helpful in training field-workers in the developing world.

Several commercial vendors of journals distributed on interactive CD-ROM include cases to reinforce knowledge gained through reading. Continuing education credits are often available. Educators have noticed that CAI and other computer instruction require a new way of looking at higher and continuing education. Instructors must adopt a new role, transforming themselves from lecturer to guide.

In a real sense this transformation happens wherever computer instructions occur. There is a shift in the control of information. The instructor is no longer the gatekeeper of information. Some professionals fear loss of control of information. Others welcome the opportunities to enhance the educational process.

Food and nutrition education instructional programmes and games

For children, delivered on floppy disk

Children tend to be early adopters of recreational and educational uses of computers. It is not surprising, then, that most food and nutrition instructional programmes have been designed for school-age children.

One example is an interactive programme, "Ship to Shore" (Pennsylvania State University, 1993). The programme, delivered on floppy disk, uses nutrition as the vehicle to integrate mathematics, science, language arts, and social studies, for late elementary school age children. Students take the part of apprentices to Christopher Columbus and face a series of decisions about their food supply while sailing from Europe to the New World. It is one of the few programmes that has a completed evaluation (Matheson & Achterberg, undated) which showed that integrating nutrition into other subject areas is an effective method to teach nutrition content. They also noted that the format of the lesson, in addition to the organization of the content, was important to promote learning. Stories and character identification effectively aroused students' feelings and engaged them in lessons. Sounds and animation incorporated into these stories helped students use their imagination. But attention must be given to realism and accuracy of graphics, to assure that the embedded nutrition concepts are focused on and interpreted correctly. Problem-solving assignments with an evaluation component were effective in helping students enjoy learning.

For children, delivered on CD-ROM

While the multimedia CD-ROM market in the United States is exploding with programmes for children, there are only a few nutrition education programmes. One of the most popular and widely distributed CD-ROM programmes is the "5-A-Day Adventures" (Dole Food

Co., 1994). This interactive programme with music and video was designed to increase the consumption of fruits and vegetables and support the United States' "5 A Day for Better Health" campaign. It includes activities about nutrients in fruits and vegetables, serving sizes, label reading, simple recipes and making salads. One feature, quick-time-movies, is used to show movies of foods growing and being processed. Students who have never seen a banana tree, for example, can watch the banana form and grow, and then be picked and packaged for shipment. Activities for teachers and parents are on the disk. Children are given an e-mail address to write to characters in the programme. There is a Dole 5-A-Day world wide web site. A comprehensive evaluation is being conducted, with results expected in 1996. Preliminary findings suggest that this application demonstrates the ability of multimedia programmes to capture children's attention, increase their knowledge and change behaviour.

"Dr. Health'nstein's Body Fun" (Cancer Research Foundation of America, 1994) is a child's multimedia CD-ROM programme that is an adventure game and fantasy programme to encourage healthy choices and promote a lifetime of fitness and health. This application demonstrates how play can be used to teach nutrition. Some people refer to these programmes as "edutainment". They argue that today's youth need programmes like these to engage them in learning. They do have the capability of giving personal feedback. No formal evaluation is planned.

For adults, delivered by interactive videodisk

The use of multimedia is not reserved for children alone. "StampSmart" is a multimedia programme currently being tested in an inner city Food Stamp office (Campbell, 1995). It requires a videodisk player and keypad. "StampSmart" is an effort to teach low-fat, low-cholesterol and high-vegetable diets to women who receive food stamps. A soap opera video is the "hook" to get the women to use the computer. The nutrition lessons and questions are like the commercial breaks between the story segments about a woman on trial for murdering her husband. It turns out the husband died of natural causes, a heart attack. Lessons are on low-fat, high-fibre eating. It takes participants about 30 minutes to view the video and answer questions on the computer screen. Results of the evaluation study to determine changes in participants' eating habits are expected in autumn 1995.

"HealthTalk" is an example of a multimedia programme designed for low literacy populations (Strecher et al, 1993). The programme is based on a frequently viewed television talk show. Hosts, experts, and lay persons interact to provide nutrition information. "HealthTalk" is housed in a kiosk and equipped with a television remote control. It collects dietary information, processes it to create a computer personalised educational and behaviour change programme, tailored to the specific dietary and lifestyle factors of the user. The programme uses algorithms encouraging goal-setting for selected dietary problems and subsequently provides performance-based feedback. The user can interact with four sessions that build on information collected from previously viewed sessions. The programme also provides printed feedback for the user to take home. Results of an extensive evaluation to describe motivation to change, perceived threat, stage of change, self-efficacy, social support, and quality of life related to dietary change is expected in 1996. Data describing the degree to which users were engaged in the intervention, their level of satisfaction with this form of intervention and the participation cost in terms of lost work time, transportation and child care, are being examined.

Other kiosk applications

Several programmes described above either have been or could be delivered using a kiosk. Interactive kiosks that dispense information, coupons and recipes are increasing in popularity in the U.S. The kiosks can be free standing or set directly on the store shelf.

Several programmes have reported that multimedia interventions are successful in changing nutrition knowledge and the attitudes of the users. The University of Texas Medical Branch in Galveston used touch-screen kiosks with bilingual programmes about pregnancy, infant nutrition, infant and childhood safety and immunisation in community-based clinics. The federal and many state co-operative extension services (CES) have used kiosks to deliver information in public places. For example, the Virginia CES placed kiosks in shopping malls and libraries, and reached people not usually served by the CES (Gleason, 1991). The University of New Mexico delivered food safety and quality programmes to Native American audiences. These applications demonstrate that people with limited or no computer skills, willingly obtain information from a computer where and when they desire it. They found traditional Native Americans as well as younger adults were pleased to interact with the systems and "Walk In Beauty With Food Safety". Kiosks are successful delivery systems when requests for information are predictable. They have a consistently good attitude, are accurate 24 hours a day, can adapt to the user's culture, including language, and are polite and on time.

Unfortunately, funding for continued or expanded use of successful multimedia programmes is difficult to obtain.

Production tools

Computer software for word processing and data storage are commonly used by nutrition educators developing and operating nutrition education programmes. However, the capability of the computer to enhance nutrition education publications is not always used. This could have an immediate impact on nutrition education.

Computer tailored messages

Word processing and desktop publishing software enable nutrition educators without computer programming expertise to develop printed materials personalised for their audiences. The computer simplifies the design and creation of multiple tailored versions of printed materials instead of using a single standardised version. More sophisticated processes can be used to individualise elements of the content as well as the structure of printed materials. A few nutrition-related programmes allow the user to input demographic and other personal data and receive a risk profile tailored message. For example, "Partners in Prevention - Nutrition" (Campbell et al., 1994) uses information to create behaviour change programmes, based on algorithms, tailored to the specific needs of the user. The programme eliminates extraneous material and presents only the information most relevant to the user. This application demonstrates that modern computer technology can allow busy health professionals to recapture the benefits of personalised attention that have been lost by the use of generic pamphlets and newsletters.

Tailoring graphics for nutrition education

Nutrition educators preparing printed materials for use in developing countries often encounter difficulty in preparing art work. The Manoff Group used computer graphic software to build better nutrition education posters and counselling cards (Tisa, 1991). While the debate continues about the quality of nutrition education materials needed for effective communication programmes, social marketing researchers have documented that the effectiveness of high quality, tailored nutrition education materials outweigh the benefits of local ownership of nutrition education materials. In Swaziland, (SNNC, 1992) an experienced artist was not available to develop the graphics needed for a weaning programme. Photographs were considered but few families were willing to pose. Some photographs were obtained and scanned into computer files. An artist, using a graphics software, produced an image bank which was used for pre-testing posters and counselling cards. The pre-testing research identified several needed changes that usually would have required reshooting photographs or redrawing pictures. The changes were easily made using the computer graphics software and the final flip chart and cards were printed locally. Images like these can be modified and used for other projects. This application demonstrates that image data banks for nutrition education programmes may allow economies in material production budgets, without sacrificing the ability to tailor materials to an audience. These materials, however, must be produced following the same standards of nutrition education materials development used in other successful programmes.

Improvement in word processing and desktop publishing software enables nutrition educators with limited computer skills to prepare professional looking newsletters, nutrition education booklets and materials. As part of its Physician Initiative, the American Dietetic Association prepared and distributed floppy disks with patient education handouts in files. These files could be easily changed to add the physician's name, address, telephone number, or other information. The files were prepared to be printed on standard printers. Nutrition education programme developers could use this approach for materials that could be tailored if desired, and to print at the delivery site. This would allow local workers to adapt materials to their audience, and make savings in printing and distribution.

Clip art and photo collections

Inexpensive photo collections and clip art software packages are also widely available. These packages are graphic images in computer readable form and are usually intended for reuse and modification by the user who selects, resizes, adds colour, or labels a picture. Users can access professional art illustrations at low cost. These programmes can produce the graphics for print or slide or computer presentations.

An example is the work done by Gould and Anderson (1995). Basic computer graphics have been utilised with the objective of enhancing nutrition education materials designed to reach high-risk populations with limited reading ability within two different Food and Nutrition Programmes. Foods were photographed, scanned/digitised, and modified using a photo-graphic software. These digitised and modified pictures were incorporated into the Creditable and Non-creditable Food Guide for the Colorado Child and Adult Care Food Programme, originally in a text format. Although a ceiling effect was seen in the statistical analysis regarding improvement

of behaviour - of child care providers and in menu reporting - the guide was well received as noted with a simple attitudinal questionnaire.

A project in progress includes the incorporation of graphic clip art into the Colorado WIC Allowable Food Guide. Based on results from preliminary evaluation of samples of nutrition professionals, WIC staff, and WIC clients, the guide is well received. They recommend the inclusion of more detailed graphics. Scanning technology is being used to digitise labels of allowable foods with multiple brand choices within a food category, e.g. ready-to-eat cereals, and incorporate those in the guide in place of the current text list.

Reading level evaluation

Nutrition educators use software programmes to evaluate reading grades.

Electronic publishing improves access to information, and increasingly, individuals and organisations in the developing world are finding ways to use technologies in spite of the difficulties (Gibbons, 1995).

Presentation software

Presentation software allow nutrition educators with multimedia computers to enhance their presentations by incorporating visuals, sound, animation, texts, and video. Nutrition instructors at many colleges and universities are beginning to use presentation programmes to enhance their lectures. The perceived benefits include improved visualisation and animation, and progressive disclosure of information. For example, an instructor can use an animated chemical or physiological reaction providing the learners with a vivid picture of the reaction. It provides the instructor with an improved ability to present abstract or complex material resulting in increased comprehension and interest. Students report that the animations are more helpful than static slides. Beerman (1995) noted that the academic performance of the average student was improved, and most students agreed that multimedia facilitated their learning. Speakers at professional meetings are also using presentation software to enhance their presentations.

Other stand-alone applications

The CD-ROM disk can be viewed as a storage system. Databases and literature are delivered on CD-ROM. CD-ROM databases offer instant access to full articles with simplified search and retrieval processes. Nutrition materials are found on disks with health information. Most CD-ROM databases are updated regularly. These databases are appropriate for professionals and consumers who need detailed information in a few specialised areas.

Some think the use of CD-ROMs as information and storage retrieval systems in the developed world will be short-lived as the access to *on-line* services grows (described later in this paper). Others believe there is great potential for the use of CD-ROM libraries of nutrition information, especially in developing countries and other areas where the costs and reliability of telecommunication remain prohibitive.

LINKAGE APPLICATIONS AND THE GLOBAL INFORMATION HIGHWAY

If you give a nutrition educator or a consumer a computer that can communicate with other computers through phone lines, satellite transmissions or network wires, you have given that individual an entrance ticket to Cyberspace or the Global Information Highway. In this section of the paper I will focus on the dissemination and retrieval of food and nutrition information by electronic means such as e-mail, Internet, world wide web (WWW) and other computer networks, electronic databases, electronic bulletin board systems, faxes, and interactive non commercial television. While much of the information presented is of interest to the professional community, access to these technologies is available to consumers. This decentralisation of access to information has great implications for nutrition educators as well as governments and international agencies who support nutrition education programmes. Therefore, discussion of these technologies is appropriate in a paper describing nutrition education for the public.

While some people discount these technologies as a passing fad, the importance of these technologies in the information age, in both developed and developing countries, is acknowledged by nutrition educators interested in learning how best to use these systems.

E-mail or electronic mail

The E-mail is a basic communication tool. Nutrition educators from different parts of the world are using e-mail to exchange ideas, projects, and data easily, quickly and relatively inexpensively. The power of e-mail is that it brings people together regardless of distance. It allows the attachment of files. The recipient can put a file into a word processor, edit and revise the document and use it or return it to the sender.

There are a variety of ways to communicate with individuals and with large numbers of users through e-mail. These include electronic fora and discussion groups. These groups exist on the Internet as well as on commercial on-line services. Some fora or lists are fully automated, others are maintained and administered by individuals. Some have limited access and others are open to everyone in the world. Some are two-way fora that allow members to discuss a topic. Others are one-way services that send newspapers, reports, and other publications to subscribers.

There are fora and discussion groups interested in international health issues. Only a few examples are cited here. See the reference section of this paper for additional health-related listings.

Food and nutrition examples

While there is a number of fora that may include food and nutrition education issues, there are a limited number of exclusive food and nutrition lists or fora. Food and nutrition education professionals are currently seeking and providing information using both the commercial on-line services and the Internet. More nutrition educators need to participate. There are also lists that allow anyone to ask for and receive information. Some of the topics include discussion and support of weight loss, recipe, and foodlore exchange, vegetarianism, food composition, food safety, and nutritional epidemiology. Some, but not all professionals, believe

that an important drawback to this freedom to give and receive information is that there is no agency or unit responsible for the accuracy of the information. These fora and discussion groups are open to users from around the world. Some believe that quality control systems need to be put in place. Others stress that we need to teach professionals and consumers alike how to assess the validity and applicability of the information, since we have never been able to control nutrition misinformation.

Examples for meeting international community need

There is a growing number of resources of interest to the international community. Examples related to nutrition education are noted here.

- World Bank PHNLink:

World Bank PHNLink is an electronic network system that links population, health, and nutrition specialists around the world through communication, interaction, and information sharing. In mid-1995 it had an estimated 1,000 subscribers. It operates two services through Internet. PHNFlash is a weekly electronic newsletter and archiving service containing information about population, health, and nutrition programmes and projects.

Information can be posted. Electronic newsletters like "Mothers and Children", a bulletin published three times a year in English, French and Spanish by the Clearinghouse on Infant and Maternal Nutrition and the American Public Health Association, are delivered more quickly and inexpensively to a greater number of readers. Additionally, the "Mothers and Children" newsletter has articles on technology such as "using video presentations for community development" and "using electronic mail".

- OMNI:

The Opportunities for Micronutrient Intervention (OMNI) was developed and funded by the Office of Nutrition of the United States Agency for International Development (USAID). Its mission is to control and prevent micronutrient deficiencies in developing countries. As part of its information dissemination effort, it uses electronic networking. For example, OMNI post reports on the micronutrient interventions. OMNI has supported work to improve the availability and access to micronutrient databases. A background paper including recommendations was prepared in 1995.

- VITA:

VITA supports a free, public, on-line discussion forum, Devel-L. It provides opportunity to exchange ideas related to technology transfer in international development.

- Clearinghouse on Infant Feeding and Maternal Nutrition:

The Clearinghouse has actively supported the assessment of information needs as well as the dissemination of resources. The Clearinghouse has collaborated with field-based organisations to strengthen their capacity to produce and disseminate information (Gibbons, 1984).

Regional networking tools

Many countries do not yet have direct access to the Internet and/or have inadequate telephone lines. Systems for networking are being developed to prevent the developing world from becoming more isolated from information sources. The emergence of cellular telephones may change the landscape of telephone communications where telephone systems have not worked. Many communications experts believe that within ten years communication linkages will not be a real problem.

Fidonet

Kenya has not had direct access to the Internet. However, the African Regional Centre for computing is able to communicate and network internationally through the Internet directly, using a low-cost dial-up technology based on Fidonet. Fidonet offers three main services: electronic mail, conference mail, and file transfers. Communication can occur several times a day (Ochuaodho, 1994).

HealthNet

SatelLife/HealthNet is a telecommunications system that links health-care workers around the world and provides them with access to appropriate sources of information. In 1995 it operated in 16 African and five Asian countries. The system, initiated by SatelLife, is a combination of low-earth-orbit satellites, ground stations and telephone-based electronic mail networks. It has been designed to function reliably and inexpensively even in areas where there are poor or non-existent telecommunications infrastructures. This and other computer networks offer exciting possibilities for ending the isolation of people in remote areas with poor access to information. While there are no projects in the area of nutrition as yet, there are plans to distribute material from various health studies conducted by the Academy of Educational Development. HealthNet offers e-mail, electronic conferencing, and long-distance education.

Worldwide networking tools

Other networking tools, also known as utilities, allow users to explore and locate valuable resources anywhere in the world. Some of the better known tools include Almanac, Gopher, and the WWW. Almanac and Gopher allow only text. Almanac is an information server, where requests are submitted and processed through the e-mail. Gopher is a tool that provides a menu structure for navigating and locating resources world-wide. WWW is used by millions of people. Users with direct access to Internet, as well as those who use a commercial vendor to access it, can receive graphics, pictures, sound, and video. The statistics keep changing but one prediction is that there will be more than 11 million users of WWW by 1998. In February 1995 an estimated 27,000 sites existed with more than five million documents. The number of sites is doubling every 53 days and the number of documents is doubling every six months. At present it is recognised as a fairly inexpensive way for organisations to offer information about themselves to anyone who seeks it, or stumbles on it while "surfing" the Web. The Web displays information in the form of pages which can contain colour photographs, recorded voices or musical selections as well as text. The text can include highlighted words that are called Hyperlinks and refer the user to other pages. Two popular web browsers, "Netscape" and

"Mosaic" can take you to a WWW Home Page at the click of a mouse. That Home Page may simply provide a directory of the information stored at that site. It may also allow the user to interact and complete activities like subscribing to a newsletter. Universities and governments were the first to operate Web Sites, as the computers in which Web information resides are known. But businesses and individuals are now doing so. For example, a student put the USDA Food Guide Pyramid on a Home Page. A Nutrition Home Page from Mexico can be reached at the address: hhttp://www.spin.com.mx/nutrimex/nutrimex.html. There are many Home Pages for health organisations and food industries.

The benefits of electronic information found on WWW are: around the clock accessibility, low cost, and immediate availability. Often the data available are more up-to-date than printed materials. The cost to the user is usually the telephone call or Internet connection. A browser allows users to easily go to WWW sites without using complicated computer commands.

Another example of a WWW site of value to nutrition educators is the site maintained by The International Food Information Council (IFIC,1995). The site provides colourful graphics and text, educational materials, scientific research, recent survey data, and tips for health professionals and educators. There is a special section for journalists reporting on food, nutrition and health topics, as well as sound bits from noted experts. It can be reached by using its WWW address http://ificinfo.health.org or Gopher address of gopher://ificinfo.health.org.

Food and nutrition on-line services

The Food and Nutrition Information Centre (FNIC) of the USDA, National Agricultural Library, Beltsville MD (fnic@nalusda.gov) has been a leader in cataloguing sources of food and nutrition information available electronically. Electronic databases are computerised collections of information, usually covering a specific subject, that are arranged to facilitate efficient retrieval and use.

Computer on-line services offer fast, low-cost access to much of the world's accumulated nutrition and medical wisdom. On-line can deliver up-to-the-minute information. It is much like having access to a library without leaving the office, complete with a personal librarian to conduct a search. It is possible to instantly retrieve information like abstracts, read material on screen, and download material as hard copy. Subscriptions to on-line databases are good for people who want current and general information. Some on-line services have Personal Clipping Services, that alert the user automatically to new items of interest.

The services available are constantly changing. Some of the better known include the International Food and Nutrition Database (IFAN), a full text database containing a wide range of food and nutrition documents for health professionals and consumers (ceasing operation autumn, 1995). The Agricola database from the National Agricultural Library and Medline produced by the National Library of Medicine are on-line and useful in locating journal citations on specific topics such as food and nutrition and medical topics. Some other databases include WHO Micronutrient Deficiency Information System (MDIS), and PAHO/WHO Nutrition database system. Others exist, that are limited to data on a specific nutrient or condition.

There are also electronic journals and newsletters available through commercial on-line services. Some are electronic versions of publications also distributed in print such as the magazine "Cooking Light". Others are designed and transmitted only electronically to permit greater reach and frequency of updates.

Electronic bulletin board systems

These computerised systems usually focus on a specific subject area and a target audience. The users can access publications, bibliographies, software, calendars, bulletins, and other resources. Some of the better known ones include the Agricultural Library Forum (ALF) of the USDA, and the Nutrient Data Bank Bulletin Board from the Agricultural Research Service, which offers computer files on the nutrient composition of food. The U.S. Food and Drug Administration maintains a board with food labelling, food safety and food regulation information. The Technology Transfer Automated Retrieval System (TEKTRAN) contains information about the latest studies in agriculture, food, and nutrition. Research results and interpretative summaries are provided. For example, The Food Guide Pyramid database is a collection of nutrition education materials that feature the Food Guide Pyramid. Listings include the source, ordering information, language, audience and keywords and it is found on ALF and the FNIC Gopher. There are several other bulletin boards with information of interest to the international health community.

Other electronic services

Fax on demand

This is also referred to as information in an instant. Many groups are allowing access to information such as news releases and journal advertisers, by fax on demand. An individual using a touch-tone phone can call a known fax service, listen to the menu and request information that will then be faxed. A subscription service like AG Daily News, lists daily information available by fax. This system allows fast and low-cost distribution of information to those who seek it.

Computer conferencing

Computer conferencing is available at different levels of interaction from one-way video with various types of communication support, to the most sophisticated systems of two-way audio and with two-way video.

- University courses:

Several universities like Kansas State University (KSU), USA, are offering their traditional classes through computer conferencing. At KSU several food science courses are transmitted to the student's home or office. The student needs a personal computer with a modem. A communication software is provided, and access comes through a toll-free long distance connection. Training in computer communications is included at the beginning of the course. Benefits include university credits or Continuing Education Units (CEUs), ability to

identify new resources and contacts, interaction with others in the same field, improvement of knowledge, and professional development.

Montana State University offered a food safety telecomputing course to teachers nationwide. Teachers dialled into the university via modem and hooked into a computer conferencing system. Participants could take the course on their own time schedule. The students communicated with each other through e-mail and bulletin boards about their experiences implementing food safety activities in their classroom (Stein, 1994).

- Personal conferencing:

Video conferencing is also available, that allows a person to use the computer at his/her desk, and on demand meet with one or several colleagues for real time interactions including video. This technology is being used for participation in remote teaching or distance learning by widely dispersed faculties or experts. This system also allows attendance at regional meetings, sharing visual images with distant colleagues, work group meetings with participants at multiple world-wide sites, consultation with experts and attendance at committee meetings.

Interactive television (ITV)

The commercial communication industry focuses its attention on the ability of consumers to use ITV for home shopping. But there is growing use of ITV for educational (often called distance learning) and health services (Telemedicine). ITV, which requires either satellite transmission or sophisticated phone lines, provides several levels of interaction. Some systems allow one-way video. Some one-way video systems are enhanced by the use of telephone lines, faxes or the e-mail. Other systems allow one-way video but two-way audio.

- Telemedicine:

Telemedicine is broadly defined as the use of telecommunication technologies to deliver medical information and services. It generally means, however, the use of remote electronic clinical consultation. It is typically two-way video and two-way audio, which enables diagnosis, treatment and other health-care activities. Some of the opportunities that Telemedicine provides include extending the expertise of health-care professionals to rural clinics, nursing homes and ultimately individual homes; allowing speciality consultations to a patient in his/her home community; creating an environment for collegial relationships to develop among people in different locations; and transmitting and receiving continued education. Clinical telemedicine programmes are underway in 40 of the 50 states in the USA.

- Opportunities for distance learning:

The potential for ITV in distance learning is great. There are several examples of the use of interactive TV for distance learning in public health and nutrition. Several public health nutrition programmes have used satellite television to extend the reach of high demand courses or workshops. Toll-free numbers are available to allow students live interaction with the instructor. These programmes allow field-workers to obtain important education without being away from

their jobs for long periods of time. Local workshops often supplement the broadcasts (Haughton, 1995).

Several food and nutrition agencies have used interactive TV for training conferences. For example, the North Carolina and Georgia Co-operative Extension Services developed a food safety conference for child-care workers. The programme was transmitted to audiences across the two states. The audience had the opportunity to complete learning activities with others at their site as well as the chance to call in questions to a panel of experts. Learners were able to communicate with the instructors via telephone. Videotapes of the presentation which included the instructor's presentation as well as pre-recorded videos that demonstrated the issues, activity kits, and slides of bacteria, were made and distributed for later reuse. Evaluation is in progress (Lackey, 1995). Instructors at several universities teach nutrition workshops or courses using two-way audio and two-way video systems (similar to the Telemedicine described earlier) that allow students to interact as if they were sitting in a classroom (Balch, 1995).

Several types of systems have been described above. The use of computer conferencing and ITV can expand the reach of education. Learners can access information regardless of place and time. There are always trade-offs. As the level of interactivity among instructors and learners increases, the learner loses control over time and place for learning. The use of these technologies for distance learning are being evaluated. Some of the issues under study include ease of use and learning the system, aesthetic appeal, clarity of feedback, error handling and controls for parallel and serial group communications, and costs.

In addition to televised conferencing, instant two-way audio communication via satellite has been successful in nutrition education in the South Pacific (Renda & Riordan, 1983).

ISSUES IN COMPUTER HARDWARE, SOFTWARE AND TRAINING FOR NUTRITION EDUCATORS

Several issues are beyond the scope of this paper, including: (i) specific hardware and software requirements needed for nutrition education programming; (ii) specific computer skills needed by the nutrition educator; and (iii) selection of an appropriate computer consultant. There are organisations and agencies dedicated to the development of educational multimedia and distance education. They should be consulted for answers to those questions. For example, OMNI (1995) described hardware and software requirements for users of micronutrient databases as well as capacity and skill for application and use. The Board on Science and Technology for International Development (BOSTID) also has relevant fact sheets for the novice computer user. Johnson (1992) describes keys to sustainable microcomputer-based information systems in developing countries.

Professional groups are beginning to identify what the term "computer literacy" means for its profession. For example, the Society for Teachers of Family Medicine's Working Group on Computer Applications in Medicine recently proposed computer skills that should be acquired by all medical students before they complete their training. The tentative list includes working knowledge of e-mail, word processing, spread sheets, computerised medical records, and data management programmes such as SPSS or SAS. A similar set of skills needs to be developed for nutrition educators.

Most individuals develop computer skills by reading manuals; viewing videotapes; trial and error at the computer; conferring with a colleague or a computer tutor; learning from their children; or attending workshops and classes sponsored by employers, community colleges and commercial companies. There has been little specific computer skills training for nutrition educators.

Some organisations, such as the Association for Progressive Communications, the Clearinghouse on Infants and Maternal Nutrition, SatelLife, BOSTID and the Society for Teachers of Family Medicine, have developed fact sheets and articles as introductions to understanding terminology and these tools. These materials are appropriate for nutrition educators to use in their personal computer skill development. The Clearinghouse on Infant Feeding and Maternal Nutrition has held workshops for capacity building and strategic development of communications.

The Society for Nutrition Education (SNE) has included programming to increase awareness about technology in nutrition education for several years. SNE has sponsored a session at its annual meeting where software authors interacted one-to-one with meeting participants to discuss the software they authored, the resources needed to develop the programmes, the acceptability to the intended audiences, evaluation data, and the trials and tribulations of developing computer-based applications. Several on-line applications have also been demonstrated at the SNE meeting. In 1995 SNE offered its first all day hands-on multimedia development workshop. All of these activities have been well received by participants. More hands-on training activities need to be supported at the meetings nutrition educators attend. Organisations have been reluctant to schedule these type of sessions because of logistics and expense.

Nutrition educators planning to create computer programmes have either needed to identify an instructional designer and computer programmer to work with them or personally develop those skills. There are how-to books on creating all types of software programmes and Home Pages. Most programmes described in this paper were developed by teams with the nutrition educator as the content specialist. Kolasa (1994) has described the roles and responsibilities of the multimedia team developing nutrition education materials. She assumes that nutrition educators do not have the time, interest or skills to develop these programmes. The talents and roles of other professionals, including the instructional designer and computer programmer, in the development of software programmes must be respected. The nutrition educator's time is best spent in determining the food and nutrition message and then ensuring its accuracy when delivered.

CONCLUSION

Computer technologies, both stand-alone and on-line applications, provide many opportunities for nutrition education. However, to date there have been only a limited number of programmes developed and evaluated. Nutrition educators have had minor participation in on-line applications. Examples demonstrating some of those opportunities have been described. There is a variety of issues facing nutrition educators who choose to use technology to enhance their efforts.

Access

The issues of access by the professional for stand-alone applications is often overstated. In developed and developing countries it is common for projects and programmes of all sizes to have a computer. The capabilities of most computers, even if purchased for other activities, are often not fully utilised. Computers can be used for more than word processing and data storage. However, nutrition educators need training and time to practice. They need time to experiment adding nutrition education to assessment programmes. For the public, access is becoming less of an issue. Interactive television, kiosks in medical centres, physicians offices, libraries, grocery stores, and work sites, have been used successfully in nutrition education efforts. Most stand-alone applications can be loaded on computers housed in kiosks and placed in public places.

For Cyberspace access, the concerns at first appear to be more serious, especially where telephone lines are unreliable. Some professionals in developing countries are finding ways to access the e-mail. Many agencies are concerned with preventing the creation of a greater information gap between developing and developed countries. Alternatives to traditional phone systems are being developed. In places where fax transmissions are possible, the simple addition of a modem and computer with a communication software may make communications faster and less expensive than faxing. Perhaps the biggest barrier to access is the attitude of nutrition educators themselves. Nutrition educators need to be informed and participate, as appropriate, in these information technology access issues. Nutrition educators should not wait until they are given access but work toward obtaining access to Internet or other networks. Nutrition educators need to participate in health-related discussion groups and other networks to create a presence for nutrition. Where e-mail is available but under utilised, nutrition educators may need orientation programmes to become more comfortable with communicating by computers. Then they should use the e-mail to exchange programme ideas and successes. Nutrition educators need to incorporate the new technologies to process and exchange information. Additionally they should not wait until access is achieved, but rather be developing plans, programmes, and databases to be ready for implementation when access barriers are eliminated. Nutrition educators need to collaborate with those who have access.

Effectiveness

The use of technology will not guarantee a more successful nutrition education or communication programme. The design and selection of appropriate technology for the purpose of the programme are critical. In some cases, programmes can reduce the human time needed to collect and analyse data, thereby increasing the time for counselling or teaching, or reaching more people. Technology can be used to enhance the efforts of nutrition educators but all forms of communication can be effective. While computers provide a powerful medium, other means of communication may be more appropriate to a given situation. It is important to determine the way the intended audience learns, and then to design programmes and campaigns that use a combination of media. Some elements of computer programmes that are important to evaluate with the intended audience in mind include: instructional design; branching capability (too much or too little); screen design; learner control and user interface; navigational issues; realism related to the programme's goals; level of decision making; feedback; record keeping; and balance of video, audio, animation, text and graphics. There is a growing body of literature describing the elements of software design important to successful computer nutrition education efforts.

Elements such as storytelling and interactivity are critical to engaging the user. Strategies for evaluating effectiveness are needed.

For the public

Technology can be used to enhance the efforts of nutrition educators. Computer technology, especially multimedia for nutrition education, requires that programme planners have a vision for educating in a different manner. These applications hold great promise but are new and only limited evidence has been accumulated to demonstrate that computer programmes may be more effective than current communication techniques in nutrition education. Computer programmes have been effective in: providing the public with access to information when health professionals are unavailable; engaging a user visually, sometimes for longer periods of time, to enhance learning; creating tailored messages that enhance behaviour change and compliance; giving straight information without bias; allowing conversations between health-care professionals and patients without regard to distance or time; providing medical decision support and expert advice; tailoring information to age, sex, language, literacy level, ethnic background, socio-economic status, geographic location, lifestyle, and/or medical history; and helping consumers to ask better questions and be more involved in their nutrition treatment plans. These programmes will only be successful, however, if they are designed to reach out to people and entice them to participate in their health care.

For production of quality nutrition education materials

Resources for the development and production of quality nutrition education materials are always scarce. Computer programmes can provide real economies in materials production, printing and distribution.

For the nutrition professional

For the nutrition professional, computer technologies hold promise for maximising education. The participants of the 1994 Bellagio Conference and the International Conference on Nutrition (1992) noted that responsive training and research efforts were needed to improve the efforts to reduce global malnutrition. The Bellagio conference report included a guiding principle that suggested training programmes should use a variety of methods including technologies appropriate to the training context. Computer technologies can meet some of the training principles outlined. They can be field-based, reiterative, and designed to build and maintain confidence. Computer technologies can be used in distance learning and require little absence from the job site. E-mail and electronic networks can be used for continuing education and discussion among trainees.

Consultation

There are many computer consultants available. Selecting the consultant who knows what hardware and software best suits the nutrition education programme is critical. Johnson (1992) described seven important keys to sustainable development of microcomputer-based information systems in developing countries. These can be helpful in selecting a consultant. Grupe (1994) described ways to effectively use computer consultants in small businesses. Many of the points

are relevant for nutrition educators. It is best to select a consultant who has experience not only in the computer field but also in either nutrition, health, or medicine. The consultant needs to be able to train the staff in the use of the hardware and software. The trainer needs to do more than demonstrate the programme. The trainer needs to supervise the trainee "driving the programme". Training should be available to both women and men.

Purchasing software from an established company that produces easy-to-use software may mean there is no need for a trainer. However, time specifically for the nutrition educator to set up and practice the use of the software is imperative.

For nutrition educators developing software, selecting a programmer who knows the appropriate code (i.e., C Language or Authorware) and Platform (i.e., IBM or MAC) is critical. An instructional designer is needed to ensure the programme is educationally sound and programmable. A project manager is needed to ensure all the components are identified, acquired and compiled according to the time and budget schedules.

RECOMMENDATIONS

All nutrition educators must become familiar with computer technologies in order to determine those which might enhance their efforts in nutrition education for the public. All nutrition educators should receive training in computer skills and be given opportunities to practise those skills. They should obtain access to the Internet or other electronic networks to enable them to exchange food and nutrition information. They should participate. Nutrition educators who use computer software should provide feedback and evaluation data to the programme developers regarding its effectiveness in their setting. Some nutrition educators must actively test nutrition education delivered via new technologies.

For nutrition educators to be able to determine which computer technologies might enhance their efforts, governments and international agencies supporting nutrition education efforts must create opportunities:

(i) For capacity building. Nutrition educators need funded opportunities to obtain the computer skills needed to use stand-alone and on-line applications. They need time and access to equipment to practise those skills.

A number of institutions and agencies are committed to supporting professionals in adopting and using communication technologies. New programmes may not be needed. However, it appears that nutrition educators are not involved in these organisations nor do they have access to the materials. The FAO nutrition programme could collect and distribute handouts on building computer skills. The programme could also sponsor participation of nutrition educators in courses and workshops offered by commercial as well as educational institutions or organisations. They could provide opportunities at the regional level, similar to the SNE sessions where nutrition educators become more familiar with both stand-alone and on-line linkage applications.

These educational opportunities and increased awareness would elevate the level of computing knowledge among nutrition educators.

(ii) For nutrition educators to practise skills by having local governments supply computer hardware and software. Agencies could sponsor competitions for acquisition of hardware and software. Awards could be given for demonstration, implementation and expansion projects.

(iii) For nutrition educators to develop and evaluate new or adapt interactive approaches to nutrition education for new audiences. Little is known about the types of media and messages that appeal to different audiences.

Governments and international agencies must provide financial support for demonstration and evaluation of technology and innovative practices that allow recipients of nutrition education and promotion to receive messages tailored to their specific interests and needs. Projects for both consumers and professionals are needed.

FAO and other agencies should explore the opportunities that computer software provide for development, adaptation, and dissemination of print and graphic nutrition education materials.

(iv) For nutrition educators to use successful programmes. Government and international agencies must provide the financial support for widespread implementation of programmes that change users' behaviours.

(v) For directors, managers, and nutrition educators to discuss the impact of decentralisation of information.

Professionals at all levels and consumers will have access to both credible and inaccurate nutrition and self-help information. Governments should ensure that field-workers are not prevented from obtaining access to computer-mediated technology (stand-alone and, especially, linkage applications) because of a fear of loss of control of information or loss of power by their supervisors.

International and government agencies should provide the leadership for redefining the role of the nutrition educator during this time, characterised by the decentralisation of information. Agencies should provide workshops and other training opportunities for nutrition educators to develop skills to help consumers appropriately access and use available nutrition information.

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GLOSSARY

Almanac: a tool to navigate the electronic information highway, text only.

Applications to distance learning: using computers and technology to teach students in a location separate from instructors.

Browsers: a software designed to navigate in world wide web.

Bulletin board: an electronic bulletin board is a place where messages are stored and anyone may browse the messages. These are often called NEWS GROUPS.

CD-Rom: a high density storage medium on which electronic data is etched and read by a laser beam.

Computer conferencing: emulates face-to-face conference where many people meet to discuss an issues of common concerns. Participants can generally contribute their comments at their own convenience.

Computer-mediated communications: when a computer is used as a go-between between a teacher and student; between a health care giver and the patient.

Computer-text-on-screen: text, similar to that found in a text book, is programmed into a computer file and shown on a computer screen.

Cyberspace: a popular term referring to world wide web (WWW).

Desktop publishing: publishing by means of a personal computer. It synthesises the capabilities of typesetting, graphic design; book production and platemaking in one integrated, cost effective hardware and software station.

Electronic mail (e-mail): is electronic mail; a document sent from one individual to another via an electronic delivery service.

FIDONET: a network of more than 15,000 individual computerized bulletin boards.

Floppy disks: a magnetic storage medium.

Global information highway: electronic access to global information.

Gopher: a tool to navigate the electronic information highway, text only.

Interactive television (ITV): television that provides at least one-way video and two-way audio; may use two-way audio and two-way video allowing everyone to feel like they are in the same room.

Internet: a system of interconnected computer networks. It provides access to computers, electronic mail, bulletin boards, databases and discussion groups.

Kiosk: a computer housed in a box.

Laser disk: a large phonograph size record that has images, video, sound and other impressions permanently pressed into its service. It is played on a laser disk player.

Linkage applications: computer software applications that require a link by telephone or other communication tool.

Listserv: an electronic discussion group organised around a common interest or topic. To become a member of a Listserv one sends an e-mail message to the List owner or List management software.

Mosaic: a software for navigating the world wide web.

Multimedia: definitions vary but the term has come to represent fully integrated components which include sound and/or music, full motion video, interactions with the user, non-linear navigation and more. Some educators define multimedia as text, graphics and animations on computer screens, perhaps complemented by audio. A light hearted definition is any media that have more than three plugs into an electrical source.

Netscape: a software to navigate the world wide web.

On-line applications: programmes that run with connection to networks, modems, satellite, or other electronic communication technology (e.g. e-mail).

Quick-time-movies: a phrase for incorporating video into computer programmes.

Satellite media tour: an interviewee is placed in a studio with a satellite connection that allows two-way audio and two-way video with interviewers in other locations.

Stand-alone applications: computer software that require no more than the computer and perhaps some peripherals like a laser disk player and/or a CD-ROM drive.

Telemedicine: use of telecommunication technologies to deliver medical information and services to locations at a distance from the care giver or educator.

Touch-screen computer system: a computer with a monitor that responds to the touch of the finger on a screen rather than use of keyboard or mouse.

World Wide Web (WWW): a tool for working with collections of data or databases around the world.

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47/7 Utilizetion of tropical foods. fruits end leaves, 1990 (E F S)

47/8 Utilizetion of tropical foods enimal products, 1990 (E F S)

48 Number not assigned

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As part of the commitment to improving nutrition in developing countries, FAO organized the Expert Consultation on Nutrition Education for the Public, held in Rome from 18 to 22 September 1995. During thie meeting 14 intemstionsl experts discuesed eix papers which sre presented in full in this document. These technicsl pepers were commiseioned by FAO. They were prepsred by some of the experts, end others hsd made comments to them prior to the discueeione. The pspers cover past experiences snd needs for nutrition educetion; e fremework for nutrition education programmes; nutrition educstion snd communication strategies for different groups snd settings; training neede for nutrition educstion; evsiustion of nutrition educstion programmes; snd new developments in computer-mediated technology for nutrition educstion. This document complements FAO Food snd Nutrition Psper No. 59, publiehed in 1995, which presents the report sdopted during the Expert Consultation.

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